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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 42.] 1945. [No. 7.

A LIST OF ANOPHELES CONCERNED WITH TRANSMISSION OF DISEASE IN MAN.

Compiled by JOHN HULL GRUNDY,

Royal Army Medical Corps.

*Notorious vectors are marked with an asterisk.

Species	*Distribution*	*Disease*
1. *aconitus* Dönitz, 1902 ...	Indian and Malayan Orient, Polynesian Oceania (W.)	Malaria; important vector some areas. Filariasis (*W. bancrofti*).
2. **albimanus* Wiedemann, 1821	C. American, Andean and N. Brazilian Neotropica (N.)	Malaria; a principal vector. Filariasis (*W. bancrofti*).
3. *albitarsis* Lynch Arribálzaga, 1878	C. American, Andean, N. and S. Brazilian and Argentine Neotropica	Malaria; vector, Brazil. Filariasis (*W. bancrofti*).
4. *algeriensis* Theobald, 1903 ...	European and Mediterranean Palaearctica	Malaria; minor importance. Filariasis (*W. bancrofti*).
5. *amictus* Edwards, 1921 ...	Australian Oceania (N.)	Filariasis (*W. bancrofti*).
6. *annularis* van der Wulp, 1884 (=*fuliginosus* Giles, 1900)	Indian, Malayan and Chinese Orient	Malaria; minor importance. Filariasis (*W. bancrofti*).
7. *annulipes* Walker, 1856 ...	Australian Oceania ...	Malaria; minor importance.
8. **aquasalis* Curry, 1932 (=*tarsimaculatus* of some authors)	C. American, Andean (N.) and N. Brazilian Neotropica	Malaria; important vector. Filariasis (*W. bancrofti*); infected in nature.
9. *argyritarsis* Robineau-Desvoidy, 1827	C. American, Andean and N. and S. Brazilian Neotropica	Malaria; minor importance.
10. *austeni* Theobald, 1905 ...	C. Trop. Ethiopia ...	Malaria; minor importance.
11. *baezai* Gater, 1933	Malayan Orient ...	Malaria; minor importance.

	Species	*Distribution*	*Disease*
12.	*bancrofti* Giles, 1902	Polynesian and Australian (N.) Oceania	Malaria; suspected vector, New Guinea. Filariasis (*W. bancrofti*).
13.	*barbirostris* van der Wulp, 1884	Indian, Malayan and Chinese Orient, Polynesian Oceania	Malaria; minor importance. Filariasis (*W. bancrofti* and *W. malayi*).
14.	**bellator* Dyar & Knab, 1906 ...	N. Brazilian Neotropica	Malaria; important vector, Trinidad.
15.	*brunnipes* (Theobald, 1910)...	C. Trop. Ethiopia ...	Malaria; minor importance, Belgian Congo.
16.	**claviger* (Meigen, 1804) (=*bifurcatus* Meigen, 1818)	European and Mediterranean Palaearctica	Malaria; most important urban vector, Palestine, Syria.
17.	*coustani tenebrosus* Dönitz, 1902	Mediterranean Palaearctica, N. and S. Trop. Ethiopia, S. Ethiopia	Malaria; suspected vector S. Africa (in winter).
18.	*crucians* Wiedemann, 1828 ...	Eastern United States Nearctica, Central American Neotropica	Malaria; minor importance.
19.	*cruzi* Dyar & Knab, 1908 ...	N. and S. Brazilian Neotropica	Malaria; doubtful importance.
20.	**culicifacies* Giles, 1901 ...	Indian Orient... ...	Malaria; most important vector, Ceylon, important, India.
21.	**darlingi* Root, 1926	C. American, Andean, N. and S. Brazilian and Argentine Neotropica	Malaria; important vector. Filariasis (*W. bancrofti*); infected in nature.
22.	*d'thali* Patton, 1905	Mediterranean Palaearctica, Indian Orient (N.W.)	Malaria; suspected vector.
23.	*eiseni* Coquillett, 1902 ...	C. American, Andean and N. Brazilian Neotropica	Malaria; doubtful importance.
24.	*emilianus* Komp, 1941 ...	N. Brazilian Neotropica	Malaria; doubtful importance.
25.	**fluviatilis* James, 1902 (=*listoni* Liston, 1901)	Indian and Malayan Orient, Mongolian Palaearctica (Turkestan)	Malaria; important vector.
26.	**funestus* Giles, 1900	N. and C. Trop. Ethiopia, S. Ethiopia	Malaria; important vector. Filariasis (*W. bancrofti*); important vector.
27.	**gambiae* Giles, 1902 (=*costalis* Giles, 1900)	Mediterranean Palaearctica (sporadic), N. and C. Trop. Ethiopia, S. Ethiopia	Malaria; most important vector. Filariasis (*W. bancrofti*); important vector.

	Species	*Distribution*	*Disease*
28.	*goeldii* Rozeboom & Gabaldon, 1941	N. and S. Brazilian Neotropica	Malaria; doubtful importance.
29.	*grabhami* Theobald, 1901 ...	C. American Neotropica	Malaria; minor importance.
30.	*hancocki* Edwards, 1929 ...	N. Trop. Ethiopia ...	Malaria; important vector where prevalent.
31.	*hargreavesi* Evans, 1927 ...	N. Trop. Ethiopia ...	Malaria; important vector where prevalent.
32.	*hectoris* Giaquinta Mira, 1931	C. American Neotropica	Malaria; minor importance.
33.	*hyrcanus* (Pallas, 1771) ...	Mediterranean Palaearctica	Malaria; minor importance.
34.	*hyrcanus X* Venhuis, 1939 ...	Malayan Orient ...	Malaria; important vector, Java, Celebes. Filariasis (*W. bancrofti*).
35.	*hyrcanus nigerrimus* Giles, 1900	Indian, Malayan and Chinese Orient, Polynesian Oceania (W.)	Malaria; important vector some areas, Malaya, Netherlands Indies. Filariasis (*W. bancrofti*).
36.	*hyrcanus sinensis* Wiedemann, 1828	Indian, Malayan, Chinese and Japanese Orient	Malaria; important vector, China, S. Japan. Filariasis (*W. bancrofti* and *W. malayi*).
37.	*jeyporiensis* James, 1902 ...	Indian, Malayan and Chinese (S.) Orient	Malaria; vector, India, Tonking area.
38.	*jeyporiensis candidiensis* Koidzumi, 1924	Indian, Malayan and Chinese Orient.	Malaria; important vector, south-west China, Tonking area
39.	*karwari* (James, 1903) ...	Indian, Malayan and Chinese Orient	Malaria; doubtful importance.
40.	*kochi* Dönitz, 1901	Indian and Malayan Orient	Malaria; minor importance, India, Netherlands Indies.
41.	*leucosphyrus* Dönitz, 1901 ...	Indian and Malayan Orient	Malaria; Netherlands Indies; important in Burma.
42.	*lindesayi japonicus* Yamada, 1918	Chinese and Japanese Orient	Malaria; minor importance.
43.	**maculatus* Theobald, 1901 ...	Indian, Malayan and Chinese Orient	Malaria; important vector, Malaya, Netherlands Indies. Filariasis (*W. bancrofti*); probable vector.
44.	*maculipennis* Meigen, 1818 ...	European and Mediterranean Palaearctica	Malaria; minor importance.

	Species	*Distribution*	*Disease*
45.	**maculipennis atroparvus* van Thiel, 1927	European and Mongolian Palaearctica	Malaria; vector, Netherlands, Spain, Portugal, Maritime Siberia, N. Manchukuo and Mongolia.
46.	**maculipennis freeborni* Aitken, 1939	W. United States Nearctica, C. American Neotropica (N.W.)	Malaria; most important vector, west coast interior. Equine encephalitis; infected in nature.
47.	**maculipennis labranchiae* Falleroni, 1926	Mediterranean Palaearctica	Malaria; important vector.
48.	*maculipennis messeae* Falleroni, 1926	European and Mediterranean Palaearctica	Malaria; vector, Rumania.
49.	*mangyanus* (Banks, 1906) ...	Malayan Orient ...	Malaria; suspected vector, Philippines.
50.	*marshalli gibbinsi* Evans, 1935	N. and C. Trop. Ethiopia	Malaria; minor importance.
51.	**melas* (Theobald, 1903) (=*gambiae* var. *melas* Theobald, 1903)	N. & C. Trop. Ethiopia	Malaria; important vector.
52.	**minimus* Theobald, 1901 ...	Indian, Malayan and Chinese Orient	Malaria; most important vector, foothills north India, Burma, South China.
53.	*minimus flavirostris* (Ludlow, 1914)	Malayan Orient ...	Malaria; principal vector, Philippines.
54.	*moucheti* Evans, 1925 ...	N. and C. Trop. Ethiopia	Malaria; importan. vector some areast
55.	*moucheti nigeriensis* Evans, 1931	N. Trop Ethiopia ...	Malaria; important vector some areas.
56.	*multicolor* Cambouliu, 1902 ...	Mediterranean Palaearctica	Malaria; minor importance.
57.	*neomaculipalpus* Curry, 1931	C. American, Andean and N. Brazilian Neotropica (N.)	Equine encephalitis; experimental.
58.	*nili* (Theobald, 1904) ...	N. and C. Trop. Ethiopia	Malaria; important vector some areas.
59.	*novumbrosus* (Strickland, 1916)	Malayan Orient ...	Malaria; vector Malaya.
60.	*oswaldoi guarujaensis* Ramos (=*tarsimaculatus* of some authors)	N. and S. Brazilian Neotropica	Malaria; vector, Brazil.
61.	*oswaldoi metcalfi* Galvão & Lane, 1937 (=*tarsimaculatus* Root, 1923)	N. and S. Brazilian Neotropica	Malaria; minor importance, Brazil.
62.	*oswaldoi noroestensis* Galvão & Lane, 1937	N. and S. Brazilian Neotropica	Malaria; vector, Brazil.
63.	*oswaldoi oswaldoi* Galvão & Lane, 1937 (=*tarsimaculatus oswaldoi*, Peryassú, 1922)	C. American, Andean and N. and S. Brazilian Neotropica	Malaria; experimental, Brazil. Filariasis (*W. bancrofti*); experimental.
64.	*pallidus* Theobald, 1901 ...	Indian Orient... ...	Malaria; minor importance. Filariasis (*W. bancrofti*).

	Species	*Distribution*	*Disease*
65.	*pattoni* Christophers, 1926 ...	Chinese Orient (N.) ...	Malaria; important vector, China.
66.	*pharoensis* Theobald, 1901 ...	N. & C. Trop. Ethiopia, S. Ethiopia, Mediterranean Palaearctica	Malaria; important vector, Upper Nile Province, Sudan.
67.	*philippinensis* Ludlow, 1902	Indian and Malayan Orient	Malaria; important vector, Bengal. Filariasis (*W. bancrofti*).
68.	*plumbeus* Stephens, 1928 ...	European Palaearctica	Malaria; doubtful importance.
69.	*pretoriensis* (Theobald, 1901)	N. and C. Trop. Ethiopia, S. Ethiopia	Malaria; minor importance.
70.	*pseudopunctipennis* Theobald, 1901	E. & W. United States Palaearctica, Central American, Andean and N. and S. Brazilian Neotropica	Malaria, important vector some areas.
71.	*pulcherrimus* Theobald, 1902	Mediterranean and Mongolian Palaearctica, Indian Orient	Malaria; minor importance.
72.	*punctimacula* Dyar & Knab, 1906	C. American, Andean and N. Brazilian Neotropica	Malaria; important vector, Panama.
73.	**punctulatus* Dönitz, 1901 (probably = *p. farauti* Laveran, 1902)	Polynesian and Australian (N.) Oceania	Malaria; important vector, New Guinea. Filariasis (*W. bancrofti*).
74.	**punctulatus farauti* Laveran, 1902 (=*p. moluccensis* (Swellengrebel and Sw. de Graaf, 1920)	Polynesian and Australian (N.) Oceania	Malaria; most important vector.
75.	**quadrimaculatus* Say, 1824 ...	E. United States Nearctica, C. American Neotropica	Malaria; the most important vector, United States.
76.	*ramsayi* Covell, 1927 (=*pseudojamesi* Strickland & Chowdhury, 1927)	Indian and Malayan Orient	Malaria; minor importance. Filariasis (*W. bancrofti*).
77.	*rhodesiensis* Theobald, 1901...	N. and C. Trop. Ethiopia, S. Ethiopia	Malaria; minor importance. Filariasis (*W. bancrofti*).
78.	*rufipes* (Gough, 1910) ...	N. and C. Trop. Ethiopia, S. Ethiopia	Malaria; doubtful importance.
79.	**sacharovi* Favr, 1903 (=*elutus* Edwards, 1921)	Mediterranean and Mongolian Palaearctica	Malaria; important, vector, Balkans, Palestine.
80.	*separatus* (Leicester, 1908) ...	Malayan Orient ...	Malaria; minor importance.
81.	*sergenti* (Theobald, 1907) ...	Mediterranean Palaearctica, Indian Orient (N.W.)	Malaria; vector, Egypt, Palestine.
82.	*smithi* Theobald, 1905 ...	N. Trop. Ethiopia ...	Malaria; doubtful importance.
83.	*splendidus* Koidzumi, 1920 ...	Indian, Malayan and Chinese Orient	Malaria; minor importance.

	Species	*Distribution*	*Disease*
84.	*squamosus* Theobald, 1901 ...	C. Trop. Ethiopia, Madagascan and S. Ethiopia	Filariasis (*W. bancrofti*).
85.	**stephensi* Liston, 1901 ...	Mediterranean Palaearctica (E.) and Indian Orient	Malaria; important vector, some urban, some rural areas. Filariasis (*W. bancrofti*).
86.	*stephensi mysorensis* Sweet & Rao, 1937	Indian Orient... ...	Malaria; minor importance
87.	*strodei* Root, 1926	C. American, Andean, N. and S. Brazilian and Argentine Neotropica	Malaria; doubtful importance.
88.	*subpictus* Grassi, 1899 (=*rossi* Giles, 1899)	Indian and Malayan Orient, Polynesian Oceania	Malaria; important vector, Celebes. Filariasis (*W. bancrofti*).
89	*subpicius malayensis* Hacker, 1921	Malayan Orient ...	Malaria; doubtful importance.
90.	**sundaicus* (Rodenwaldt, 1926) (=*ludlowi* Theobald, 1903 var. *sundaica* Rodenwaldt, 1926)	Indian and Malayan Orient	Malaria; important vector, Bengal, Malaya, Indo-China, Netherlands Indies. Filariasis (*W. bancrofti*).
91.	**superpictus* Grassi, 1899 ...	Mediterranean Palaearctica, Indian Orient (W.)	Malaria; important vector, south Europe, Middle East.
92.	*tessellatus* Theobald, 1901 ...	Indian and Malayan Orient	Malaria; minor importance.
93.	*triannulatus* (Neiva & Pinto, 1922)	C. American, Andean, N. Brazilian, S. Brazilian and Argentine Neotropica	Malaria; suspected, Venezuela. Filariasis (*W. bancrofti*); experimental.
94.	*turkhudi* Liston, 1901 ...	Mediterranean Palaearctica, N. Trop. Ethiopia (E.), Indian Orient	Malaria; suspected vector.
95.	*umbrosus* (Theobald, 1903) ...	Indian and Malayan Orient	Malaria; important vector some areas.
96.	*vagus* Dönitz, 1902	Indian and Malayan Orient, Polynesian Oceania	Malaria; minor importance, India, Netherlands Indies.
97.	*varuna* Iyengar, 1924 ...	Indian Orient... ...	Malaria; important vector some areas, India, Burma. Filariasis (*W. bancrofti*).
98.	*vestitipennis* Dyar & Knab, 1906	C. American and Andean Neotropica	Malaria; minor importance, Honduras.
99.	*walkeri* Theobald, 1901 ...	Canadian (S.E.) and E. United States Nearctica	Malaria; doubtful importance.

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(No references are given for the notorious anopheline vectors starred with an asterisk, or for well-known vectors of less importance.)

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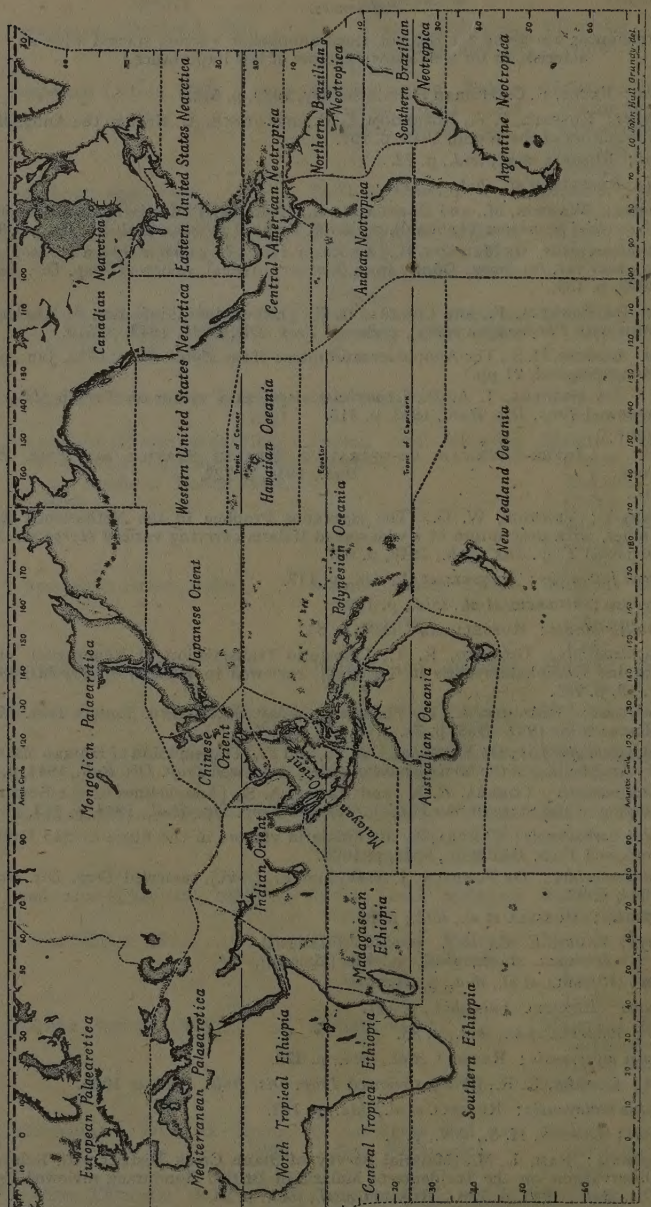

Key to the Distribution Regions and Sub-Regions referred to in the list of Anopheles concerned with transmission of disease in man.

DISTRIBUTION REGIONS AND SUB-REGIONS.

PALAEARCTIC REGION
1. European Palaearctica.
2. Mongolian Palaearctica.
3. Mediterranean Palaearctica.

ETHIOPIAN REGION
4. North Tropical Ethiopia.
5. Central Tropical Ethiopia.
6. Southern Ethiopia.
7. Madagascan Ethiopia.

ORIENTAL REGION
8. Indian Orient.
9. Malayan Orient.
10. Chinese Orient.
11. Japanese Orient.

AUSTRALIAN REGION
12. Australian Oceania.
13. New Zealand Oceania.
14. Polynesian Oceania.
15. Hawaiian Oceania.

NEARCTIC REGION
16. Canadian Nearctica.
17. Eastern United States Nearctica.
18. Western United States Nearctica.

NEOTROPICAL REGION
19. Central American Neotropica.
20. Andean Neotropica.
21. Northern Brazilian Neotropica.
22. Southern Brazilian Neotropica.
23. Argentine Neotropica.

PENICILLIN :
INDICATIONS FOR ITS USE AND METHODS OF ADMINISTRATION*

INDICATIONS.

1. The suitability of a case for treatment with penicillin depends not so much on the nature of the disease as on the susceptibility of the microorganism causing it : some species are highly susceptible, and others far too resistant for this treatment to have any effect. It follows that in diseases which may be caused by any of several different bacteria (*e.g.*, meningitis, peritonitis) a bacteriological diagnosis is usually necessary if treatment is to be undertaken with any assurance of success.

The chief organisms susceptible to penicillin are :—

Gonococcus.
Meningococcus.
Staphylococcus aureus.
Streptococcus pyogenes.
Streptococcus viridans (most pathogenic strains).
Pneumococcus.
C. diphtheriae.
Clostridia of gas-gangrene.
Spirochaetes of syphilis and relapsing fever : possibly of Weil's disease.
Actinomyces.
B. anthracis.

II. *Penicillin is indicated* in the treatment of the following conditions when due to a susceptible organism unless the infection is likely to respond rapidly to sulphonamides :—

(*a*) Septicaemia (systemic administration).
(*b*) Puerperal sepsis (systemic administration).
(*c*) Acute cellulitis (systemic administration).
(*d*) Acute osteomyelitis (systemic administration).

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*Memorandum issued in March, 1945, by the Ministry of Health, and reprinted in full, by kind permission.

(*e*) Cavernous and lateral sinus thrombosis (systemic administration).
(*f*) Pneumonia (systemic administration).
(*g*) Meningitis (intrathecal injection, often combined with systemic administration).
(*h*) Carbuncles and acute abscess (systemic or local administration).
(*i*) Certain types of empyemata (intrapleural injection).
(*j*) Suppurative arthritis (intra-articular injection, sometimes combined with systemic administration).
(*k*) Anthrax (systemic administration).
(*l*) Actinomycosis (systemic administration).
(*m*) Gonorrhoea, acute and chronic (systemic administration).
(*n*) Gas gangrene and " malignant oedema " (systemic administration).
(*o*) Other acute infections due to organisms sensitive to penicillin but resistant to sulphonamides.

III. *Penicillin is often of value* in the following conditions :—

(*a*) Burns (cream or spray).
(*b*) Sycosis barbae (cream or spray).
(*c*) Impetigo (cream or spray).
(*d*) Dermatitis with infection (cream or spray).
(*e*) Conjunctivitis and infections of cornea (eye drops, cream or lamellae).
(*f*) Infected wounds (powder, cream, or in solution).
(*g*) Encouraging results have recently been obtained in infections of the mouth and throat, using pastilles containing penicillin.
(*h*) Penicillin may be used as a prophylactic agent in wounds exposed to infection.
(*i*) Infections of the urinary tract due to sensitive organisms (systemic administration).

IV. *Penicillin may be of value* in the following diseases, but its place in relation to other forms of treatment has not yet been defined :—

(*a*) Syphilis.
(*b*) Subacute bacterial endocarditis.
(*c*) Diphtheria.
(*d*) Acute mastoiditis and otitis media.
(*e*) Peritonitis.
(*f*) Chronic osteomyelitis.

V. *Penicillin is of doubtful value or of no value* in the following conditions, for which it should *not* be used :—

(*a*) Tuberculosis.
(*b*) Acute rheumatic fever.
(*c*) Rheumatoid arthritis.
(*d*) Ulcerative colitis.
(*e*) Infections caused by viruses such as influenza, anterior poliomyelitis and encephalitis lethargica.
(*f*) All Gram-negative bacillary infections such as typhoid fever, dysentery, undulant fever, and infections with *Bact. coli*, *H. influenzae*, *Proteus*, *Ps. pyocyanea*, and *Bact. Friedländer*.
(*g*) Glandular fever.
(*h*) Pemphigus.
(*i*) Hodgkins disease and the reticuloses.
(*j*) Leukaemia.
(*k*) Malaria.
(*l*) Cancer.

Administration.

Unless the following properties of penicillin are appreciated, unsatisfactory therapeutic results are likely to be obtained and wastage of this expensive drug is bound to occur :—

(*a*) Once penicillin has been removed from the ampoule or tube it is likely to deteriorate, particularly if exposed to moisture or heat. Solutions or other preparations of penicillin exposed to air and kept at room temperature will not deteriorate significantly in 24 hours, but should not be kept for more than 48 hours under these conditions.

(*b*) Penicillin is rapidly destroyed by boiling, by most antiseptics, and by enzymes of many of the common air bacteria.

(*c*) Penicillin should not be given by the mouth.

(*d*) Penicillin passes rapidly from the blood into vascular tissues, but the serous membranes and meninges present a barrier which penicillin does not readily penetrate.

(*e*) Penicillin is rapidly excreted in the urine ; for this reason, it must be given at frequent intervals or continuously.

(*f*) The diffusion of penicillin into dead or avascular tissues is slow ; sequestra, large sloughs, or collections of pus, are, therefore, likely to harbour bacteria out of reach of the drug, and these usually have to be removed if treatment is to be effective.

I. *Systemic administration.*—Either the sodium or calcium salt may be used.

(*a*) *Intramuscular injection.*—15,000 units dissolved in 2–3 cc. of sterile water or saline are injected every three hours throughout the day and night. This method is simple and effective, but many patients find it difficult to tolerate, on account of the pain produced.

(*b*) *Continuous infusion* by " drip " of 100,000 to 120,000 units daily into a muscle or vein. The drawback of the intravenous route is the high incidence of thrombosis ; otherwise this method is very satisfactory. The main drawback of the intramuscular route is discomfort, and the development of local oedema when large amounts of fluid are given. This does not occur if special equipment delivering 100 cc. in 24 hours at a constant rate is used. The apparatus required is comparatively simple, and this method of administration is preferred by many.

(*c*) *The duration of treatment* varies considerably, according to the condition and response of the patient but should seldom be for less than five days or more than 12 days. Treatment is usually continued for about two days after a favourable response has been obtained.

(*d*) *The dosage* described above is recommended for all conditions requiring systemic treatment except the following :—

(1) Syphilis ; 240,000 units daily for 10 days has been recommended.

(2) Gonorrhoea ; in uncomplicated cases a total of 100,000 units given in one day is usually effective.

(3) Bacterial endocarditis ; a daily dose of 240,000 units has been recommended, but even prolonged treatment may be unsuccessful.

(4) Actinomycosis ; the dosage varies considerably, according to the sensitivity of the actinomyces.

(*e*) *Toxic reactions.*—Pure penicillin will probably prove to be virtually non-toxic, but penicillin as used at present contains impurities which occasionally give rise to minor reactions, such as fever, and urticarial rashes.

II. *Local application.*—When applied locally, penicillin must be brought into contact with the infecting organism. Merely to apply penicillin to the surface of an infection of considerable depth, such as a boil or carbuncle, is to waste time and penicillin.

(*a*) *Solutions* in sterile water or saline of 250 units or more per cc. are used for local treatment. The solutions may be used for injection through tubes stitched into wounds after closure, or through a needle into *abscess cavities* after aspiration of pus. The injection should be made twice daily. Irrigation of an open wound is ineffective.

Burns of the face may be sprayed but penicillin creams are usually preferred for burns in other areas.

In *meningitis* a strength of 1,000 units per cc. is generally used, and from 5–10 cc. are usually injected daily by lumbar or cisternal puncture. (The purer the penicillin, the less likely it is to produce meningeal irritation).

In *empyema* 25,000 to 75,000 units in 50–100 cc. are injected every day, or on alternate days, into the pleural cavity.

For *infections of the eye*, drops of 500 to 2,000 units per cc. may be applied every half to two hours.

(*b*) *Powders.*—Penicillin (preferably the calcium salt) is mixed with sufficient sterile sulphanilamide or sulphathiazole powder to produce a final concentration of 2,000 to 5,000 units per gram. The powder can be blown with an insufflator on to raw surfaces or into wounds, and the application should be repeated once or twice daily.

(*c*) *Creams.*—Several types of cream have been recommended, but the following is satisfactory for most purposes :—

The base consists of 30 per cent. lanette wax SX in water. The requisite amounts of lanette wax and water are heated to 40°C. The water is slowly mixed into the wax in a mortar, and stirring is continued until the mixture is almost cold. This usually takes about ten minutes, when a smooth cream is formed. The emulsion is then autoclaved at 20 lbs. pressure for 20 minutes. When it has cooled to about 40°C., the correct amount of penicillin, dissolved in a few cc. of sterile distilled water, is added and thoroughly mixed with a sterile rod or spatula.

The cream is usually applied daily.

III. Further instructions regarding the use of penicillin in the treatment of V.D. are in course of preparation, and will be issued in due course to all V.D. authorities.

SUMMARY OF RECENT ABSTRACTS.*

VI. PLAGUE.

Epidemiology.

TRUFANT (p. 481), in a general account of sylvatic plague in the United States, states that reservoirs of infection have been proved in more than 31 rodents and in rabbits. In *Public Health Reports*, Washington (p. 36) a statement is made of the incidence of plague in the United States during 1942. There was one human case, and infection in rodents or their ectoparasites was detected in six western States.

It has not been very clear how plague is carried over in a rodent population from season to season, but in an investigation of plague in ground squirrels in

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1944, v. 41. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

California, MEYER *et al.* (p. 398) have now established the fact that latent disease occurs in these animals. In this form of plague there are no inflammatory or encapsulated lesions, but the bacilli persist in the tissues, and have been found in 15 of 90 pools of pulped spleen, liver and lymph glands from 440 animals. The authors point out that estimation of plague in field rodents by examination for visible lesions is futile because such examinations cannot detect this latent plague. It is thought that bacteriaemia may develop in latent plague, and permit the infection of ectoparasites.

SÁENZ VERA (p. 481) reports that proof has been obtained of Macchiavello's finding that fleas inhabiting the nests of rats can preserve a plague infection for a long time, and that for this reason plague, though absent from the animal population for several months, may reappear later. This fact is important in any plan for control. Nests and burrows can satisfactorily be destroyed by cyanogas or flame-throwing bombs. The author notes that guineapigs or cuis are often responsible for epizootics, and that these animals are rather domestic than sylvatic in habit.

In discussing sylvatic plague in the province of Córdoba, Argentina, DE VILLAFAÑE LASTRA *et al.* (p. 398) point out that the disease exists in the rodents of the forest and agricultural regions of the north, and that it is at present uncontrollable, forming a permanent focus which may become a menace to the urban centres.

KAMAL and his colleagues (p. 566) discuss plague in Egypt, where the disease is endemic, but where epidemic outbreaks occur from time to time. In their opinion the accepted incubation period (6 days) is too short, since they have seen cases arising on the 13th day in contacts left in their homes. [An explanation of this may perhaps be transmission by *Pulex irritans*, as suggested by Blanc and Baltazard below.]

TOWNSEND (p. 480) notes that plague is reported every year in Port Said, and though the numbers of cases are usually small, the disease might become epidemic. In 1942 pneumonic plague was reported for the first time, and nine cases occurred in a month. At first the correct diagnosis was not made. Treatment with sulphapyridine was not successful in either bubonic or pneumonic cases.

METZNER (p. 480) has published an account of the development and spread of plague in Africa.

Transmission.

Plague is usually transmitted from rat to man by rat fleas, but transmission from man to man by *Pulex irritans* [though it has certainly been postulated] is not generally considered important. BLANC and BALTAZARD (p. 281) were attracted to this possibility when they observed the frequent occurrence of successive cases in individual families during an outbreak of plague in Morocco. They collected *P. irritans* from persons who had died of plague and from the rooms they had occupied, and from these collections isolated 29 strains of *P. pestis* by animal inoculation. The organism was transmitted to clean fleas allowed to feed on a patient, and was found to persist for 21 days in fleas from infected houses. Animals were infected by the bite of fleas taken from the houses of dead persons.

ROUBAUD and GIRARD (p. 567) give reasons for thinking that *Paractenopsyllus kerguisteli* and *Synopsyllus fonquernii*, which infest many species of mammals in the forest region of Madagascar, may be important in the spread of sylvatic plague.

PRINCE (p. 37) notes that the fleas *Opisocrostis tuberculatus tuberculatus*, *O. labis* and *Oropsylla rupestris* have been proved possible vectors of plague. He has now demonstrated that *Opisocrostis bruneri* and *Thrassis bacchi* are effective

transmitters after feeding upon infective animals, that they are, in fact, as effective as the well-known species *Xenopsylla cheopis* and *Diamanus montanus*. All these fleas have been found on rodents in the United States, and there is a continuous chain of possible hosts and vectors from the Rocky Mountains to the States east of the Mississippi; hence the danger of spread of sylvatic plague to the hitherto uninfected eastern States.

Burroughs (p. 669) has succeeded in transmitting plague experimentally by the flea *Malaraeus telchinum*.

Hecht (p. 1034), in a study of a small outbreak of human plague in Venezuela, relates it to the presence of *Xenopsylla brasiliensis* among the *Rhopallopsyllus* fleas captured on sylvatic rodents, in which the disease was present. He thinks that, in field studies, not only the flea index, but also a count of species of fleas should be made, so that the prevalence of known plague vectors can be assessed.

Aetiology.

Girard (p. 36) argues that the plague and pseudotuberculosis organisms should not be included in the *Pasteurella* group; he now quotes experiments which showed that these organisms may be sensitive to phages of the dysentery group. Nevertheless, this fact does not justify any contention that the organisms of plague and dysentery have antigenic characters in common. In a discussion of this view, Blanc agreed that the lytic principle of the plague bacillus could not be transferred to the Pasteurellas, and said that the latter, instead of multiplying in *Xenopsylla cheopis*, were destroyed in 24 hours. He therefore agreed with Girard.

Macchiavello and Paracampos [this *Bulletin*, 1943, v. 40, 49] have already shown that *P. pestis* can survive for 284 days on solid media kept at laboratory temperature. Francis (p. 214) now reports that viable bacilli were recovered from cultures on beef infusion agar, which had been kept at 10°C. for 24 years. Some of the animals injected with these cultures after that period of time died of acute plague, others died but without the signs of plague, others survived.

Sokhey and Habbu (p. 129), after careful tests under strictly controlled conditions, have found the optimum temperature for the growth of *Pasteurella pestis* in broth to be 27°–28°C. At this temperature growth was about five times as abundant as at 37°C. Limiting temperatures are—2°C. and 45°C. The same authors (p. 129) have found that growth is optimum at *p*H 7·2–7·6, and fairly good between 6·6 and 8·0. Buffering of the broth medium greatly reduced the growth.

Devignat (p. 668) had previously found that continuous aeration of the culture medium resulted in loss of virulence of *P. pestis* growing in it. In repeating the experiment he used quicklime instead of caustic potash to treat the air before bubbling it through the culture, and failed to reduce the virulence. He now thinks that the reduction which originally occurred was due to radio-activity of beta-emanation from the caustic potash, and that this was not present when lime was used. By using hydrogen washed in caustic potash, in much the same way, he has obtained a non-toxic strain of *Clostridium tetani*.

McMahon (p. 753) has shown that, although natural infection has been reported in the hamster (*Cricetus cricetus*), the golden hamster (*Mesocricetus auratus*) is highly resistant to plague, in comparison with other test animals, and is not suitable for routine test experiments.

Vaccination: Control.

The Director of the Haffkine Institute (p. 38) states that the research undertaken there has confirmed the greater protective power of living avirulent immunogenic vaccine over killed vaccine. A method has now been found of

reducing at will the virulence of a strain, and the immunogenic power can be measured during the process of attenuation. Suitable strains can therefore be chosen as desired for the preparation of live vaccine. It is probable that continued subculture will cause strains to lose their immunogenic power altogether. The killing of cultures by methods so far used greatly reduces their immunogenic power.

Jawetz and Meyer (p. 400) believe that properly tested live vaccines are safe, and better in immunogenic power for experimental animals than any killed preparations now in use. The vaccines must be composed of avirulent organisms (*i.e.* unable to cause death of an animal unless introduced in sufficient quantity to cause toxic death without multiplication) and it is necessary that the strain be developed from a single cell. If this is done there is no danger of reversion to virulence. Avirulent strains may be produced by growth of virulent strains in alcohol-broth at high temperature, by isolation of single colonies and prolonged incubation in broth at 32°C., or by passage through immune animals. The authors point out that the antigenic constituents of importance in immunization may differ in their resistance to heat, and that strains are protective in different degrees to different animals.

The same authors (p. 753) make it clear that, although there is strong support for the use of live avirulent vaccines rather than of dead organisms, it is not every avirulent organism which is immunogenic. The immunogenic activity of a strain cannot be correlated with invasiveness or survival in the body, and must depend on antigenic constitution, because strains are distributed equally and persist for the same length of time in different host animals, yet immunogenic activity is different for these animals. The distribution of virulent and avirulent strains differs only quantitatively in the animals. Large, toxic doses of avirulent organisms produce a cumulative mortality curve which closely resembles that found after injection of small doses of virulent bacilli.

These same workers (p. 847) note that loss of virulence of *P. pestis* is to some extent selective for the species of test animal used. At one time it was suggested that possession of an envelope was a factor in determining virulence [see this *Bulletin*, 1941, v. 38, 327] but the authors do not accept this view, and state that investigation into antigenic constitution has not solved the problem. The most striking character which serves to differentiate virulent from avirulent organisms is the inability of the latter to proliferate freely even in susceptible experimental animals. [In the original abstract this inability to proliferate was wrongly given as a character of virulent organisms.] Chick embryos are highly susceptible to plague, and are killed in four to eight days by 20 virulent or 200,000 avirulent *P. pestis*. In small dose the avirulent organisms fail to proliferate in the organs; the virulent organisms do so. The susceptibility exhibited by chick embryos is attributed to absence of cellular defence mechanism. Hyperimmune serum does not protect them, which indicates that a cellular mechanism must be present for antiserum to exert its protective action.

Porges (p. 482) has demonstrated that rats are able to burrow under walls 48 inches below the surface, but that a sure protection of buildings is afforded by curtain walls to a depth of 24 inches, provided that at the bottom of these walls there is a horizontal flange projecting 8 inches.

Clinical Findings: Treatment.

de Villafañe Lastra and Rodeiro (p. 399) describe plague meningitis in four cases of bubonic plague. In all the cerebrospinal fluid was turbid and contained the bacilli. As these cases were found in a series of 39 hospital admissions for plague in whom the cerebrospinal fluid was examined, the authors believe that meningitis would be found more often than hitherto, if a systematic investigation of the nervous system were made in all cases.

Sokhey and Wagle (p. 37), in a field study of the treatment of plague, have reached the conclusion that the most important single factor which influences the result of treatment is the occurrence and degree of septicaemia. Without septicaemia, spontaneous recovery is usual, but with septicaemia this is not so. Mild septicaemia is that in which less than 10 colonies develop from 0·25 cc. of blood; severe septicaemia is that in which more than 10 appear. In the series of cases considered, no selection was practised except that patients who died within 24 hours are excluded, and treatment was given with serum, sulphathiazole, sulphapyridine, sulphathiazole with serum, or (as controls) with intravenous iodine. For all cases the death rates with the first four of these treatments varied from 20 to 27 per cent., with iodine it was 53·6 per cent.; for septicaemic cases only, the rates were from 38·1 per cent. (sulphathiazole with serum) to 72·2 per cent., for the first four groups; with iodine the rate was 96·4 per cent. The doses of the sulphonamides were:—sulphathiazole 10 gm. the first day and 7·5 gm. daily for 4–5 days (blood concentration 5–10 mgm. per cent.); sulphapyridine 8 gm. the first day and 3–4 gm. daily for four days (concentration 5–10 mgm. per cent.). Treatment did not save any of the 10 pneumonic cases, which were not included in the figures given above.

The Director of the Haffkine Institute (p. 38) reports that the efficacy of sulphathiazole seems to be evident, and that a marked advantage was noted when serum and sulphathiazole treatments were combined.

Kallat (p. 940) reports on the results of sulphonamide treatment of plague in India. Sulphapyridine and sulphathiazole were used, in doses of 7½ gm. the first day, 4 gm. daily on the 2nd and 3rd days, 3 gm. daily on the 4th–6th days. The results were somewhat disappointing, with a case mortality rate of 42 per cent., but this was probably due to the fact that in many cases treatment was late.

de Villafañe Lastra *et al.* (p. 400) have experienced very good results in the treatment of plague (the diagnosis having been confirmed bacteriologically) with sulphathiazole, in spite of earlier failure with sulphanilamide and sulphapyridine. Sulphathiazole should be given early and in high dosage (10 gm. daily for an adult, to maintain a blood concentration of 8 mgm. per cent. or more) and should be continued until cure is effected, unless there is manifest intolerance of the drug. The authors have no faith in serum treatment.

Jawetz and Meyer (p. 1034) state that the treatment of choice is obtained by the use of hyperimmune serum in combination with chemotherapy. Hyperimmune serum was obtained from rabbits given three intravenous injections of living, avirulent *P. pestis* on alternate days. In this serum there was no correlation between the antitoxic and the antibacterial power; a detectable level of antitoxic substances is attained only if a re-stimulating injection is given 3–4 weeks after the primary series of injections. A mouse test is described for the assay of anti-infectious and antitoxic substances in such sera.

The same authors (p. 1035) note that plague antiserum is weak in comparison with other antisera. In a study of immunity in plague they emphasize opsonic activity. Whole blood of immune animals can destroy a much greater number of plague bacilli than blood of normal animals; the activity seems to be inherent in the plasma, not in the cells. Immune animals are able to fix the bulk of injected *P. pestis* at the site of injection, but fixation does not involve lymphatic blockage. Splenectomy does not reduce resistance to plague. They also note that extracts of both virulent and avirulent plague strains contain a spreading factor.

Kamal *et al.* (p. 566) advocate combined treatment with serum (not less than 80 cc.) and sulphapyridine (2 gm. on admission followed by 1 gm. in two hours and then 1 gm. every four hours). For rat control they use a local preparation of *Urginea* (*Scilla*) *maritima*.

WAYSON and MCMAHON (p. 848) have used sulphadiazine in the treatment of guineapigs infected with plague; the results indicate that there may be value in the treatment of human disease by this drug in the stage before the development of bacteriaemia. *Charles Wilcocks.*

MALARIA.

GUTSEVICH, A. V. **On the Mosquitoes of North Iran.** *C. R. Acad. Sci. URSS.* Moscow, 1943, v. 40, No. 3, 123–5. [Summary taken from *Rev. Applied Entom.* Ser. B. 1945, Feb., v. 33, Pt. 2, 16.]

A list is given of mosquitos found in northern Persia in May–July 1942, showing their abundance in two provinces on the Caspian coast and two on the Iranian plateau. The species of *Anopheles* taken were *A. maculipennis*, Mg., *A. superpictus*, Grassi, *A. hyrcanus*, Pall., *A. claviger*, Mg. (*bifurcatus*, auct.), *A. algeriensis*, Theo., *A. plumbeus*, Steph., and *A. pulcherrimus*, Theo. *A. maculipennis* was very abundant and associated with severe malaria in the humid Caspian provinces, where it bred in the numerous rice-fields. Examination of eggs showed that it was represented by two varieties in these provinces, of which one was var. *sacharovi*, Favr. It occurred in small numbers only in the much less malarious plateau provinces, which are at an altitude of over 3,000 ft. and are characterised by a dry climate, scarcity of water and poor vegetation. Of the other Anophelines, the only one considered of any importance in relation to malaria is *A. superpictus*. It was found in two districts, both on the plateau, but does not become abundant until late summer and autumn.

PAMPANA, E. J. L'immunité anti-paludéenne et son rôle dans l'epidémiologie. [**Malarial Immunity and its Rôle in Epidemiology.**] *Acta Tropica.* Basel. 1944, v. 1, 219–30.

RUSS, S. E. & GAYNOR, J. S. **Spontaneous Rupture of a Malarial Spleen.** *J. Amer. Med. Ass.* 1945, Mar. 31, v. 127, No. 13, 758.

TEMKIN, O. & RAMSEY, Elizabeth M. **Antimalarial Drugs. General Outline.** 110 pp. [Bibliography.] National Research Council. Division of Medical Sciences. Issued by the Office of Medical Information. (Under grants of the Carnegie Corporation and the Johnson & Johnson Research Foundation.) Washington, 1944. March.

The war in the Pacific compelled careful revision of our methods for controlling malaria, and the loss of Java and its quinine supplies necessitated the overhauling of our choice and use of antimalarial drugs. The present volume is a careful review of the information available in the published literature about such compounds and it has been compiled as a basis for the revision which the military situation demanded.

The first part of the work describes the quinine situation in war-time, the principles on which the antimalarial compounds pamaquin (plasmoquine) and mepacrine (atebrin) were discovered, and the general pre-war opinions about antimalarial drugs are set out in the Third and Fourth General Reports of the Malaria Commission of the Health Organisation of the League of Nations, issued in 1933 and 1937 respectively. A list is included based on the review by CURD [this *Bulletin*, 1944, v. 41, 101] of the main compounds studied during the pre-war years with indications of their action upon avian, simian and human

malaria. Detailed summaries are given of the literature concerning the pharmacology, antimalarial activity and toxicology of quinine, mepacrine, and pamaquin. These summaries should prove valuable to the investigators who are now engaged in studying the use of these compounds under war conditions, and it is mainly for them that this work has been compiled; but to the general student they would prove misleading on many points, for they omit all the newly acquired information which is now restricted to confidential reports, and which considerably modifies pre-war views in many particulars. Similarly the section on "Treatment Plans of Malaria under Present War Conditions" is more valuable as history than as a guide to immediate conduct. This section does not reach any conclusion as to the relative merits of quinine and mepacrine; as will be remembered, recent statements by the American Board for the Co-ordination of Malarial Studies and by the Malaria Committee of the British Medical Research Council [this *Bulletin*, 1945, v. 42, 88] declared that mepacrine was in all respects as satisfactory as quinine and in many respects it was better, especially in its greater power to suppress and to cure malignant tertian malaria. Similarly the section reviewing the action of sulphonamides on malaria can do little more than indicate that these compounds have potentialities which are worth investigating; limiting itself to published literature, it cannot go on to say that they have now been investigated and have not been adopted for current use.

Subsequent sections deal with other compounds such as thio-bismol, which show minor degrees of antimalarial action. Nowadays when new means are being sought to produce radical cure of *vivax* malaria the summary of information about neoarsphenamine is timely. The antimalarial action of this compound is limited to *P. vivax*, and it does not extend to *P. falciparum*; and even with vivax malaria, although neoarsphenamine will usually cut short the immediate attack, most reports agree that it is no more effective than quinine or mepacrine in preventing subsequent relapses. Antimonials, mercurials, amidino compounds and derivatives have all been reported to show antimalarial action under certain conditions, but in no case have the facts suggested that these compounds would be valuable for general clinical use.

To sum up, this review is valuable to the persons for whom it was designed, *viz.*, those now engaged in wartime research on antimalarial compounds, but it would be misleading in many respects to readers who have not access to American and British confidential information. *F. Hawking.*

i. Andrews, J. C. & Cornatzer, W. E. **The Effect of Acid and Alkali on the Absorption and Metabolism of Quinine.** *J. Pharm. & Exper. Therap.* 1944, Nov., v. 82, No. 3, 261–5.

ii. —— & ——. **The Absorption of Quinine Salts from Isolated Intestinal Loops of Dogs.** *J. National Malaria Soc.* Tallahassee, Fla. 1944, Dec., v. 3, No. 4, 231–6.

i. Haag *et al.* (*J. Pharm. & Exper. Therap.*, 1943, v. 79, 136), found in human subjects that the extent of urinary elimination of quinine, given orally in a single dose, was related to the *p*H of the urine. The smaller elimination in alkaline urine was assumed to be due to greater resorption of quinine from the urinary tract. Previously Acton and Chopra, and later Sinton [this *Bulletin* 1925, v. 22, 814; 1931, v. 28, 596] had recommended the giving of alkali with quinine on clinical grounds. The results of Guilosirova-Guryea [*Klinicheskaya Meditsina*, 1938, v. 16, 386) [not available to the reviewer] apparently imply that alkali delays the onset of urinary excretion of quinine without affecting the total amount excreted. The present authors, in seeking an explanation of the mechanism of these reactions, have investigated the rate and degree of absorption

of quinine from the intestinal tract under varied conditions of *p*H. In this connexion they have also considered the acid-base balance of the body as a whole, as well as its effect on the degree of metabolic decomposition of quinine, and therefore on the amount of unchanged drug excreted. The influence of the *p*H of urine on the keeping qualities of quinine excreted in it was found to be negligible when the urine was protected from light.

Isolated loops of the small intestine of dogs (described below) were used in the absorption studies. Two lines of investigation were followed. In the first the acid or basic agents were given along with quinine in the intestinal loops, and in the second they were administered orally, while the quinine salt in solution or suspension was given as before. The effect on the speed of absorption of adding equivalent amounts of alkali to either quinine bihydrochloride or sulphate in the loop will be reported later. The standard doses of quinine corresponded to 20 mgm. of the anhydrous sulphate per kgm. of body weight. When 0·5 gm. of ammonium chloride, giving a *p*H of about 5, was used in the loop, no evidence was obtained of increased rate of absorption, and the higher urinary excretion under acid conditions was left unexplained. The effect of oral ingestion of sodium bicarbonate or ammonium chloride or benzoate for two days before quinine was added to the loop, and for two days afterwards (by which time practically all quinine excretion is ended), on the rate of absorption and the percentage of the absorbed dose excreted in 48 hours, was next investigated. The absorption period was 60 minutes and control animals received quinine alone. Urine was collected by catheter at the appropriate times, and the total volume voided was known. A urinary *p*H as low as 6·0 was not attained. Relatively small amounts of quinine were excreted during the second 24-hour period. Based on the amount absorbed there was no evidence that alkali therapy delayed significantly the excretion of quinine. The lowered percentage excretion of this substance during alkali administration, as noted by other authors, was confirmed, but the results were not explained by differences in absorption following administration of acid or alkali.

ii. This paper deals with the rate and degree of absorption of therapeutic agents from the intestinal tract, and the methods employed in studying them. When such absorption is correlated with blood levels and urinary excretion, it is not always certain that changes in the parent substance, as a result of metabolic processes in the organism, are taken into account in the methods of estimation employed. In the case of quinine, for example, the methods of estimation lack specificity. When absorption is considered for the whole intestinal tract, only a single experiment is possible with each animal. The present authors use, in dogs, an isolated intestinal loop about 1 foot long from the jejunal region. The distal end of the loop, whose blood and nerve supply is preserved intact, is closed, and the proximal end is brought to an opening in the abdominal wall, and the remaining ends of the intestine are anastomosed. The method allows of repeated experiment with the same animal, as the dogs may exist on normal diet for several years. The substance whose absorption is to be investigated is placed in the loop, which can be washed out at the appropriate time, and there is no faecal loss. The absorptive surface is limited in extent, and may lose its absorptive power after a time. It was found, however, that blood levels of quinine attained by this method were the same as in normal animals. Comparison has been made of the rates of absorption of quinine base and its salts. It was found that in the early stages the more soluble dihydrochloride was absorbed more rapidly than the sulphate, but differences in the rates of absorption decreased with time. In a 30 minutes' experiment the rate of absorption of quinine base was greater than that of the sulphate. Mention is made of the results obtained in the above paper, and figures are given for the rates of absorption of salts of other alkaloids of the cinchona group. *J. D. Fulton.*

HAWKING, F. **Local Effects of Intramuscular Injection of Solvochin.** *Brit. Med. J.* 1945, Mar. 24, 412.

Solvochin is a soluble preparation of quinine with antipyrin, ampoules of 2·2 cc. containing 7½ grains of quinine base [see this *Bulletin*, 1945, v. 42, 177] and it is said to be painless when injected intramuscularly. The author investigated its action on the tissues at the site of injection for comparison with the action of mepacrine and quinine dihydrochloride observed in previous similar experiments [see this *Bulletin*, 1943, v. 40, 823; 1944, v. 41, 1005].

The solution supplied in ampoules was diluted with sterile isotonic saline (1 cc. diluted to 7·5 cc.) so that 0·5 cc. contained 16 mgm. of quinine base, corresponding to 20 mgm. of quinine dihydrochloride in 0·5 cc. which was injected in the previous experiments. Injections were made into the muscle of the loin and thigh of rabbits, and also into the subcutaneous tissue of the abdominal wall. Control injections of normal saline produced no local injury. The rabbits were killed after 1 to 8 days and their tissues examined.

Macroscopical.—The loin muscle showed a necrotic mass about 3 × 0·9 × 0·6 cm. in size, surrounded by a narrow yellow zone of leucocytic reaction. In the thigh muscles the effects were more varied—a necrotic mass in some cases, in others, small punctate haemorrhages or a whitish roughened appearance of the surface of the muscles. In the thigh the injection is largely distributed between the muscles, whereas in the loin it is chiefly retained within the muscle.

Microscopical.—Sections of the loin muscle showed necrosis and leucocytic reaction; on the first day after injection, there were many polymorphonuclear leucocytes with, sometimes, fibrinous fluid, but after 5 to 8 days, most of the leucocytes were mononuclears, and granulation tissue with fibroblasts was present; after eight days, some of the necrotic muscle fibres were becoming calcified. In the thigh muscles the necrosis varied in amount, there was a slight infiltration of leucocytes, and a moderate distension with fluid was present. In the skin some necrosis of the subcutaneous layer of muscle was found and the adjacent connective tissue showed a little fluid and a few small round cells.

"The lesions were indistinguishable in character and extent from those caused by the injection of a corresponding amount of quinine dihydrochloride."

J. F. Corson.

MCCORKLE, J. K. **Hippuric Acid Liver Function Test in relation to Malaria and Atabrin.** *U.S. Nav. Med. Bull.* 1944, Dec., v. 43, No. 6, 1163–5.

The patients had been stationed in a highly malarious area in the South-West Pacific and had taken mepacrine 0·6 gm. weekly for at least four months prior to the examination. From the large number of patients available, fifty-five were selected on account of their severe symptoms, *e.g.*, prolonged fever, delirium, vomiting and diarrhoea. The patients had also received a standard course of quinine, mepacrine and pamaquin and all but two had had two or more intensive courses of mepacrine. They were given a standard course of quinine sulphate, 2 gm. daily for three days, and mepacrine, 0·3 gm. daily for five days. On the second or third day with mepacrine, the patients were given 6 gm. sodium benzoate by mouth and the four-hour yield in urine was measured. All except eight of the patients showed a yield equivalent to 3 gm. or more sodium benzoate, which was taken as the level of normality. Five of those giving abnormal responses had icteric sclerae. One was obviously jaundiced, one gave a similar low response when the test was repeated four days later, and the other six gave normal responses when tested on the twelfth day of treatment. It was considered that the cause of the lowered liver tolerance was the malarial attack itself, since the normal condition was regained in a few days although the patient

was still taking large doses of mepacrine. In an appendix the author states that in the year since this paper was written, the dose of suppressive mepacrine has been increased to 0·5 gm. twice weekly ; no evidence of liver damage has been observed, and the incidence of malaria has been diminished. [Elaborate investigations carried out at military centres in Britain have shown that long-continued administration of mepacrine 0·1 gm. daily has no harmful effect upon the liver or kidney as evidenced by organ function tests.]

F. Hawking.

Schoof, H. F. **Adult Observation Stations to determine Effectiveness of the Control of** *Anopheles quadrimaculatus*. *J. Econom. Entom.* 1944, Dec., v. 37, No. 6, 770–79, 1 fig.

This useful paper is in the form of a discussion, the purpose of which is to list and consider comparatively the various types of adult anopheline catching stations and their organization, as used during the past four years in the Malaria Control Programme in North Carolina. The subject is considered under the headings of baited and non-baited stations, although, as the author points out, the two are not always clearly distinguishable :—" In practice, it should be kept in mind that a non-baited shelter such as an anopheline house, if placed adjacent to a pig sty, is for all entomological purposes an animal shelter." For various reasons, human habitations proved unsatisfactory as a means of judging anopheline density in baited shelters, and recourse was had to shelters housing cows, horses, pigs or goats ; chicken houses were less productive than animal shelters. Non-baited stations include such natural resting places as culverts, bridges and hollow trees ; but the most useful results were obtained by the use of non-baited anopheline houses. These are wooden shelters, $3\times3\times6$ feet, built of scrap lumber and consisting of four sides with an overlapping roof, the structure being fastened together with hooks. Such houses are easily transported and can be erected at the selected site within ten minutes of arrival. The value of light-traps is discussed and Schoof considers that their chief use is in urban areas or military posts where animal sheds are not available. The paper contains much valuable information which does not lend itself to summarization, and the article should be consulted in the original by those interested.

R. M. Gordon.

Rose, G. Fortschritte in der Bekämpfung des Läuse-Fleckfiebers und der Malaria. [**Improvements in the Control of Typhus and Malaria.**] *Acta Tropica*. Basel. 1944, v. 1, 193–218.

In this paper reference is made to experiments on the action of DDT on lice and mosquitoes. The author writes from the Robert Koch Institute, Berlin.

Das Gupta, B. M. & Siddons, L. B. **Treatment of Simian Malaria** (*P. knowlesi*) **with Stilbamidine—M & B 744.** *Indian Med. Gaz.* 1944, Nov., v. 79, No. 11, 527–8.

Infection with *Plasmodium knowlesi* in *rhesus* monkeys is practically always fatal but the infection can be controlled by atebrin or quinine. In the case of the former, however, there is a relapse rate of about 100 per cent. even after five day's intensive treatment or more prolonged treatment with small doses. After quinine the relapse rate is only 16·7 per cent. In both cases the relapses may be as severe and fatal as the primary attacks. Trials with stilbamidine reported in this paper show that 16 of 20 monkeys survived the primary infection. The drug was administered intravenously each day in doses varying with the weight

of the animal. The days of treatment varied from 1 to 8 and the dose of drug from 0·001 to 0·0175 gm. (·001 to ·005 gm. per kgm. of body weight). There was evidence that the parasites underwent degeneration during treatment. In eight of the animals which received doses of 0·002 gm. or more per kgm. of body weight only one relapsed. *C. M. Wenyon.*

HUFF, C. G. & COULSTON, F. **The Development of *Plasmodium gallinaceum* from Sporozoite to Erythrocytic Trophozoite.** *J. Infect. Dis.* 1944, Nov.–Dec., v. 75, No. 3, 231–49, 64 coloured figs. on 2 pls. [Numerous refs.]

The authors give the first complete account of the development of a malarial parasite between the injected sporozoite and the first appearance of parasites in the red blood corpuscles. This development takes place in the cells of the reticulo-endothelial system, in which it has been studied by the authors in young chickens inoculated with sporozoites of *Plasmodium gallinaceum* from the salivary glands of infected *Aëdes aegypti*. The technique adopted was to inoculate large numbers of sporozoites into a limited area of the skin of the wing. Areas of this kind were removed after desired intervals, fixed, sectioned, and suitably stained. By examination of the sections it has been possible to follow the whole development. In addition, intravenous inoculations were carried out with a view to the study of development in the internal organs.

Thirty minutes after the injection of the sporozoites into the skin they are detectable in the intercellular spaces and on the surface of the cells. A few may be seen at this stage bent or coiled within vacuoles in the cytoplasm of the macrophages. After the expiry of six hours, sporozoites are no longer found in the intercellular spaces. Instead, oval or spheroidal parasites, evidently the result of rounding off of the sporozoites, are seen in the macrophages. From the 6th to the 17th hour there is little change in these forms apart from a slight increase in size. From the 18th to the 24th hour there is a further growth, and the single nucleus becomes double. After the 24th hour there is rapid growth and the nuclei increase to over 100. The mature schizonts or segmenters make their appearance from the 36th to the 48th hour. These consist of a central core to which the merozoites are attached in a radial manner. The appearance is reminiscent of the sporozoites within the mature oöcysts on the mosquito's stomach. The whole of the development from the sporozoite to the mature schizont is termed by the authors the cryptozoic generation and the parasites themselves cryptozoites. The merozoites are cryptozoic merozoites. It is suggested that the core, as it is called, to which the merozoites are attached, may, after liberation of the merozoites, produce a further brood of merozoites. [It seems to the reviewer, however, that the core most probably represents the residual body which is commonly associated with the production of merozoites and sporozoites amongst the sporozoa.]

When the cryptozoic merozoites are liberated they enter other macrophages in the skin or, as it appears, wander further afield and enter cells of this type in other situations. These merozoites become rounded, as did the sporozoites in the first place, and develop in the same manner, finally producing mature schizonts with merozoites at about the 75th hour. The second generation, as indeed all subsequent generations of exoerythrocytic forms, to distinguish them from the first or cryptozoic generation, are given the name metacryptozoic, the parasites of these generations being termed metacryptozoites. The majority of the metacryptozoic merozoites enter other macrophages, either locally in the skin or in more remote organs, but some appear to enter the erythrocytes, as a few parasites have been seen in the blood as early as the 75th hour after the intravenous injection of a heavy dose of sporozoites. After the completion of the

first metacryptozoic cycle the second metacryptozoic cycle commences, but the development now proceeds less regularly, while practically all organs become infected.

At about the fifth day another type of schizont begins to appear. This gives rise to a large number (500–1,000) of small micro-merozoites in contrast to the earlier schizonts with a small number (100–200) of larger macro-merozoites. In animals inoculated intravenously with large numbers of sporozoites, cryptozoites are found only in small numbers in the organs. Later, however, metacryptozoites appear in the organs in abundance. As regards the appearance of parasites in the erythrocytes, the earliest was at the 75th hour. With smaller doses of sporozoites the interval is extended, till after the bite of a single infected mosquito, erythrocytic parasites are not found till the 7th to 10th day. These differences may be due, not to the later appearance of erythrocytic forms, but to the fact that with smaller doses of sporozoites they are increasingly difficult to find. After the intravenous injection of sporozoites, during a 24-hour period at about the sixth, seventh, or eighth day, there is a sudden 200-fold increase of erythrocytic forms above the number in the preceding 24-hour period. At this period large numbers of metacryptozoites producing micromerozoites are to be found in the internal organs, and appear to have a relationship to the sudden "flooding" of the blood with erythrocytic parasites.

As a control of the results obtained by the injection of sporozoites, attempts were made to follow the development after actual mosquito bites. It was found that sporozoites injected by the mosquito were able to develop locally in the skin as well as in the more remote organs. There was an exact parallel to the development following intradermal, subcutaneous or intravenous inoculations of sporozoites.

The authors point out finally that the only species of malarial parasites in which cryptozoites have been found are those in which abundant exoerythrocytic stages occur. There is a danger in assuming that all species of *Plasmodium* must have a similar development, though there is much indirect evidence against the view that a sporozoite is capable of directly invading a red blood corpuscle.

In the discussion to the paper the authors examine the earlier work of Missiroli (1933–1941), Kikuth and Mudrow (1939, 1940), Schulemann and Spies (1940) and Reichenow and Mudrow (1943) [this *Bulletin*, 1935, v. 32, 795; 1938, v. 35, 569; 1940, v. 37, 671; 1941, v. 38, 294; 1942, v. 39, 123, 399; 1944, v. 41, 190] on the development of sporozoites. The conclusion is that the work of some of these observers has added fragmentary knowledge of the life-cycles of the malarial parasites with which they worked, but in no case has the complete cycle been elucidated.

The paper is illustrated by two excellent coloured plates which depict clearly in 64 figures the various developmental forms described. *C. M. Wenyon.*

Haas, V. H. & Ewing, Frances M. **Inoculation of Chick Embryos with Sporozoites of *Plasmodium gallinaceum* by inducing Mosquitoes to feed through Shell Membrane.** *Pub. Health Rep.*, Wash. 1945, Feb. 16, v. 60, No. 7, 185–8, 1 fig. on pl.

Fertile hens' eggs which have been incubated for 10–13 days are exposed over a bright light and the site of one of the large blood vessels is marked. The egg shell is cut away at this place by a dental disk along an area 1·5 cm. long by 0·2 cm. wide, the shell membrane being left intact. The place is moistened with a drop of saliva and a jar covered with mosquito netting and containing one or two mosquitoes infected with *P. gallinaceum* is applied. With a little patience and contrivance the mosquito can be induced to feed. Out of 38 embryos

exposed to mosquitoes in this way, 21 died before hatching, six were alive but unhatched at the time of writing and 11 hatched out live chicks. In another experiment 24 eggs were bitten by presumably infected mosquitoes, and 21 chicks hatched out; two chicks showed parasites in the blood within a few days of hatching and died of the infection a few days later. In a third experiment, 32 embryos were exposed to presumably infected mosquitoes and 16 chicks hatched out; three of these showed infection within a few days.

F. Hawking.

STAUBER, L. A. & VAN DYKE, H. B. **Malarial Infections in the Duck Embryo.** *Proc. Soc. Exper. Biol. & Med.* 1945, Feb., v. 58, No. 2, 125–6.

"Intraembryonic inoculation of duck embryos with the 3T strain of *P. cathemerium* causes reproducible fatal infections with a high level of parasitemia 6–11 days after inoculation. Splenomegaly occurs in these infected embryos. Intraembryonic inoculation of *P. lophurae* produces much more variable results. Infection requires a considerably longer period to develop. This may depend upon the maturity of the erythrocyte in the embryo. Both species of plasmodia can develop in the embryo at either 37°C. or 40°C. Duck embryos can survive the intraembryonic inoculation of ground organs of malaria-infected mosquitoes if they are incubated at 40°C."

RIGDON, R. H. **A Pathological Study of the Acute Lesions produced by *Plasmodium lophurae* in Young White Pekin Ducks.** *Amer. J. Trop. Med.* 1944, Nov., v. 24, No. 6, 371–7, 7 figs.

In this paper the author describes the results of a study of the pathological lesions which occur in young ducks infected with *Plasmodium lophurae*, and compares them with the lesions seen in a fatal case of *P. falciparum* infection in a child, and in *P. knowlesi* infection in monkeys. The basic pathological lesions in these three conditions are similar. There is a marked decrease in the number of red blood cells in the spleen of the ducks that either die or are moribund when killed. The pale colour of the viscera is indicative of a severe anaemia. There is pulmonary oedema, and central necrosis in the liver, both of which appear to be consequent on an anoxic condition of the myocardium. As a reaction to the anaemia there is extensive hyperplasia of the blood-forming tissues, which results in the presence of masses of cells in the walls of the larger vessels of all the organs. These masses project into the lumen and may almost occlude the vessels. A series of illustrations depict the appearance of the microscopic pathology of various tissues.

C. M. Wenyon.

SEELER, A. O. & OTT, W. H. **Effect of Riboflavin Deficiency on the Course of *Plasmodium lophurae* Infection in Chicks.** *J. Infect. Dis.* 1944, Sept.–Oct., v. 75, No. 2, 175–8, 1 fig.

It has recently been reported that biotin deficiency increases the severity of certain avian malarial infections. It seemed of interest, therefore, to study the effect of riboflavin deficiency. Accordingly chicks on riboflavin-free diet or on diet deficient in riboflavin were inoculated with *Plasmodium lophurae*, and the course of the infection studied. It was found that in contrast to biotin a deficiency of riboflavin decreased the acute infection as judged by the parasite counts. If during the course of the infection riboflavin was administered, the severity of the infection was increased. That this reduced parasite count was not due to restriction of diet was proved by the observation that chicks having an adequate amount of riboflavin while on only half the food of a control group developed an even heavier infection than did the control group.

C. M. Wenyon.

THOMPSON, P. E. **Changes associated with Acquired Immunity during Initial Infections in Saurian Malaria.** *J. Infect. Dis.* 1944, Sept.-Oct., v. 75, No. 2, 138–49, 7 figs. [16 refs.]

A study of the course of *Plasmodium floridense* and *P. mexicanum* infection in lizards has shown that, as regards number of parasites, number of merozoites per segmenter and presence of crisis forms, the same variations occur as are observable in the course of malarial infections in warm-blooded animals. After infection there is an increase in the number of parasites in the blood till a definite peak is reached, when there supervenes a parasite decline, to be followed, if death does not ensue, by a condition of developed infection. The whole course of these events was, however, much slower than in warm-blooded animals. During the decline, pronounced changes occurred in the morphology and staining reactions of the parasites, while the mean number of merozoites per segmenter decreased by 19–33 per cent.; furthermore, there was evidence of increased phagocytosis during the crisis. It was noted that during the subsequent developed infection the changed crisis forms persisted. *C. M. Wenyon.*

BLACKWATER FEVER.

STEPHENS, J. W. W.; GORDON, R. M. & DAVEY, T. H. **A Case of Blackwater Fever in an African Girl.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1945, Mar., v. 38, No. 4, 308–10.

i. Referring to the statement by SHIRCORE [this *Bulletin*, 1945, v. 42, 185] that he could not recollect the record of any bacteriological examination of the urine and blood in the literature of blackwater fever, Stephens mentions three references of the presence of bacteria in the blood, and two others of their presence in the urine. The former were: STEPHENS and CHRISTOPHERS (*Reports to the Malaria Committee of the Royal Society*, 1900, 23), CRICHLOW (*Trans. R. Soc. Trop. Med. Hyg.*, 1929, v. 23, 179), and BOINET quoted by CARDAMATIS (*Prog. Méd.*, Nos. 37–40). The latter were: ROSS (*Lond. Sch. Hyg. Trop. Med., Mem. 6.* 1932, 196) and GORDON and DAVEY (*Ann. Trop. Med. Parasit.*, 1935, v. 29, 439).

ii. Gordon and Davey refer to their paper mentioned above and quote their summary and conclusions in full [see this *Bulletin*, 1936, v. 33, 514, in which the summary and conclusions are also quoted in full]. *J. F. Corson.*

TRYPANOSOMIASIS.

FOWLER, A. F. **Massive Dose Tryparsamide by Intravenous Drip Method in the Treatment of Trypanosomiasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1945, Mar., v. 38, No. 4, 297–304, 1 fig.

At Tamale in the Northern Territories of the Gold Coast, the author treated 42 cases of Gambian sleeping sickness with tryparsamide administered by the intravenous drip method. The apparatus was simple, consisting of a glass container and rubber tubing, the interceptor being improvised by using an intravenous needle and the barrel of a glass urethral syringe. The dose of tryparsamide was about 2 gm. daily for 6–9 days, but a day's interval was often necessary after 3 or 4 days owing to exhaustion produced by the high fever which developed during the injections. The dose of tryparsamide was dissolved in two pints of sterile double-distilled water, and a hypodermic needle was used to

enter the vein, the patient's arm being immobilized on a splint. A rate of 40 drops a minute allowed the two pints of solution to be given in eight hours.

Trypanosomes were present in the cerebrospinal fluid in 33 of the 42 patients. Eight of the patients were 6–10 years of age, one was between 11–15 years old, and 33 were over 16 years. There were 31 males and 11 females.

In three cases, acuity of vision was reduced to the perception of light only. In all the cases, the injection was accompanied by high fever and apparently caused it ; the temperature rose rapidly about one hour after the start of the injection and fell rapidly after it ended. It was exhausting to the patients and the author thinks that the seven deaths which occurred were partly due to it, and remarks that it would be interesting to see the effect of using pyrogen-free water for the injection solution.

Results.—The immediate results were very good but sufficient time had not elapsed for judging whether cure had been effected. The 35 patients who survived the treatment lost all their symptoms ; in 24 who were periodically examined during 4 to 7 months afterwards the improvement was maintained.

The author does not advise this method for elderly patients, but the shortened course of treatment is an advantage when dealing with Africans.

J. F. Corson.

USINGER, R. L. **The Triatominae of North and Central America and the West Indies and their Public Health Significance.** *Pub. Health Bull. No. 288.* Wash. 1944, iv+83, 12 pls. & 5 figs. [Bibliography.]

This monograph contains a brief account of the relations of triatomine bugs to Chagas's disease, sections on the biology of the bugs, the host relations and geographical distribution. The greater part is occupied by a systematic description of 46 species found in the area under consideration. There are useful tables of vectors and animal reservoirs of *Trypanosoma cruzi.*

Charles Wilcocks.

LEISHMANIASIS.

SEN GUPTA, P. C. **Kala-Azar in Bengal : its Incidence and Trends.** *Indian Med. Gaz.* 1944, Nov., v. 79, No. 11, 547–52, 2 figs. (1 map).

From the dispensary and hospital statistics for the years 1931–1940 published by the Government of Bengal, and the indications of the trends of incidence on the different districts obtained from the same figures for the years 1924–1942, and the assumption that the population of the districts may be taken as the mean of the populations enumerated in the censuses of 1931 and 1940, the author has calculated the incidence of kala azar in the various districts of Bengal. He finds that the distribution is very unequal. It is low in Bankura and Birbhum, while the most affected districts appear to be Murshidabad, Malda and Rajshahi. Jessore, where the first epidemic was reported in 1824, is still one of the bad areas. The figures for the individual districts are given in tables, while the intensities are shown on a kala azar map. It would seem that for the whole of Bengal the mean population is over 54 million and that during a period of ten years 1,146,686 individuals had kala azar. This would give a specific morbidity rate of at least 210 cases per annum for each 100,000 population. The author writes that, in spite of the fact that one of the best specific drugs was synthesized 22 years ago and has been in use since 1923, the incidence of kala azar is so high that it is still one of the grave problems facing the medical and public health authorities of the province.

C. M. Wenyon.

Jones, Helen, Rake, G. & Hamre, Dorothy. **Cultivation of Leishmania in the Yolk Sac of the developing Chick Embryo.** *Amer. J. Trop. Med.* 1944, Nov., v. 24, No. 6, 381–3.

The authors have cultivated strains of *L. donovani*, *L. tropica* and *L. brasiliensis* in the yolk sac of developing chick embryos of 6 to 9 days' incubation. The optimal temperature for growth varied from 23° to 28°C. One strain has been carried on for 31 passages. In most cases the growth of leishmania proved lethal to the embryos, though there was no invasion of the tissues. The leishmania develop within the yolk cells, both as leishmania and leptomonad forms, but they also appear to develop in the leptomonad form in the yolk itself. The strain of *L. donovani*, which failed to infect hamsters before yolk sac culture, was still non-infective after 31 passages. *C. M. Wenyon.*

Sen Gupta, P. C. **Observations on Malaria complicating Kala-Azar.** *Indian Med. Gaz.* 1944, Nov., v. 79, No. 11, 528–31, 4 figs.

The paper describes five cases of malaria complicating kala azar. In two a few malarial parasites were found after long search before specific treatment for kala azar had been commenced. The number was too small to account for the fever, which was not controlled by quinine though the parasites were banished. In the other three cases persistence of fever at the end of the course of antimony treatment led to the discovery of a malarial infection, both parasites and fever disappearing under quinine. It is clear that the antimonials do not influence the malarial parasites and that there appears to be some antagonism between the leishmanial and plasmodial infections. *C. M. Wenyon.*

Elkerton, L. E. **Oriental Sore. Atebrin Treatment.** *Indian Med. Gaz.* 1944, Nov., v. 79, No. 11, 519–21.

The cases recorded at the Indian Military Hospital, Quetta, for the four years 1936–1939 were 458, 109, 392, 211 (half the year only). It was noteworthy that 63·6 per cent. were in members of a cavalry unit, while the majority of others were in transport or other units closely associated with the cavalry lines. This suggests to the author that *Stomoxys calcitrans* may be a vector in addition to the sandfly [Berberian has shown this to be possible, see this *Bulletin*, 1939, v. 36, 1034]. The incubation period was on an average six months, while the number of sores varied from one to seven. The usual practice at Quetta was to scrape the sore under short general anaesthesia and to dress it weekly with tannic acid powder covered with vaseline gauze. Under these conditions healing occurred in one to ten weeks, half the cases being cured within three weeks. The scarring was very slight. Treatment by atebrin injections having been reported by other workers, this was given a trial. In cases with secondary bacterial infection the sore is cleaned with hot potassium permanganate compresses (1/5,000). On the following day superficial injections are made radially from several points on the circumference of the sore with a solution of atebrin (0·05 gm. per cc.). According to the response, injections are repeated every three to five days. The response also determines the daily dressing—weak carbolic ointment, an ointment incorporating atebrin or one containing alum to stimulate healing. The time required to bring about a cure was about the same as in the treatment by scraping. However, no anaesthetic was required and the resulting scar was minimal. The injection treatment was particularly suitable for lesions on the face. *C. M. Wenyon.*

COSTA, O. G. **American Leishmaniasis of Frambesial Type.** *Arch. Dermat. & Syph.* 1944, Dec., v. 50, No. 6, 394–5, 1 fig.

A case is described in which lesions were present on the lower part of each leg. These were soft and papillomatous, and were traversed by grooves which bounded the papillary formation. The lesions were confluent and presented an appearance resembling that of yaws, from which diagnosis must be made in these cases. *Leishmania brasiliensis* were found, and the Kahn reaction was negative.

Charles Wilcocks.

SNOW, J. S. **Unsuccessful Treatment of American Leishmaniasis with Penicillin. Report of a Case.** *Arch. Dermat. & Syph.* 1944, Nov., v. 50, No. 5, 324–5.

A patient in the Panama Zone had developed a granulomatous lesion of the entire nose, extending on to the cheeks, with lymphangitis and nodular enlargements at the angle of the jaw. Leishmania were demonstrated in the lesions. During five days 559,000 units of penicillin were administered intramuscularly and 50,000 units applied locally. There appeared to be some slight improvement in the accompanying cellulitis but there was no indication that healing was taking place, while leishmania were still present in the lesion. After five weeks' treatment with tartar emetic (1·6 gramme) the lesion had almost healed.

C. M. Wenyon.

FEVERS OF THE TYPHUS GROUP.

DARZINS, E. Rickettsienstudien. [**Rickettsial Studies.**] *Zent. f. Bakt.* I. Abt. Orig. 1943, Dec. 11, v. 151, No. 1, 18–20.

The author describes a new method of staining rickettsiae in smears. The reagents used are :—(1) A mordant consisting of Lugol's iodine solution and distilled water, 25 cc. each. The dilution should be made daily, and even the undiluted Lugol solution shows signs of falling off after about four weeks.

(2) The stain consists of 0·2 gm. pure thionin, 10 cc. of 96 per cent. alcohol, and distilled water to make up to 100 cc. The thionin is dissolved in the alcohol with constant stirring, then the distilled water is gradually added till the dye has been completely dissolved. The solution is filtered through filter paper. The solution is at its best after three days, and it can be kept till it shows signs of falling off in its action.

The author has dealt exclusively with films made from yolk-sac cultures, so the following remarks apply to these.

The film is kept for 30 seconds in the diluted Lugol solution which is then drained off and, without drying, the film is stained for five seconds in the thionin solution, then washed with distilled water and dried [presumably in air].

Extracellular rickettsiae take on a deep-blue colour and are as sharply defined as small bacteria ; they stand out clearly against the polychromatic and transparent background.

Tissues containing large numbers of rickettsiae are brown-reddish in colour ; otherwise the smear has a brownish granular appearance.

Fully developed cells of the epithelial type are stained lemon-yellow ; their nuclei are blue or burgundy-red.

Smears made from 48-hours' cultures contain the rickettsiae chiefly in the form of long blue filaments in the cells, but a few grey or black rod-shaped forms also occur. The infected cells are easily recognized by the greyish-black colour of the protoplasm, which in uninfected cells is yellow.

In four-day cultures large numbers of extracellular blue-stained rickettsiae are seen in addition to the intracellular forms. The author claims that the method is simple, the reagents are easy to obtain, and the study of the development of the organisms in cultures is greatly facilitated. *John W. D. Megaw.*

SCHRÖER, W. Ueber die Reifung der agglutinatorischen Kraft des Blutserums in vitro als diagnostisches Kriterium bei Fleckfieber. [**The Strengthening of Serum Agglutinins by Ripening *in vitro* as a Diagnostic Criterion in Typhus Fever.**] *Zent. f. Bakt.* I. Abt. Orig. 1943, July 20, v. 150, No. 5, 236–43.

The author produces evidence to show that the titre of the Weil-Felix reaction observed after a combined period of two hours' incubation and 22 hours at room temperature, is a more reliable indication of typhus infection than the titre observed after two hours' incubation He has found that in cases of typhus the titre may be low after two hours, but after a further 22 hours it usually becomes significantly high, whereas in the occasional positive reactions observed in the absence of typhus infection, the titre does not rise to the same extent. For example, in one table four cases of typhus are shown in which the titre was 1–100 after two hours ; and in these the readings after 24 hours were ±1–800, ±1–1,600, 1–400 and 1–800 respectively.

In striking contrast the table contains data referring to six cases of other diseases in which the titre after two hours was ±1–200 ; in five of these the reading after 24 hours was 1–200 and in the other it was ±1–400. Also in 12 cases of other diseases in which the reading after two hours was 1–100 the titre never rose above 1–200 after 24 hours. These examples illustrate the general run of the findings, though a few cases of typhus are included in the tables in which the later reading was only twice as high as the earlier one, and did not reach a significant height. In such cases one or more tests carried out later nearly always gave significant responses.

The conclusion reached was that definitely positive reactions at titres of 1–400 or over were diagnostic of typhus fever except in occasional cases of jaundice in which the titre might rise from 1–100 after two hours, to 1–400 after 24 hours.

[In the abstract below WINKLE expresses disapproval of the delayed reading of the reaction.] *John W. D. Megaw.*

WINKLE, S. Untersuchungen zur Weil-Felix-Reaktion. I. Mitteilung. [**Investigations into the Weil-Felix Reaction. Part I.**] *Zent. f. Bakt.* I. Abt. Orig. 1943, Dec. 11, v. 151, No. 1, 3–11.

The author has investigated the agglutination reactions of large numbers of sera tested with O and H cultures of *Proteus X19* and *X2* ; with *HXK* (containing also an O element) ; and with three other strains of *Proteus* organisms.

He defines O-agglutination as being granular in type and H-agglutination as flocculent. With O-strains of organisms the reaction is always granular, but with H-strains, which often contain also an O element, there may be a combination of the granular (O) and the flocculent (H) types of agglutination.

During 1941 and 1942 sera from 824 patients, known or suspected to be suffering from typhus fever, were tested ; of these, 310 gave positive reactions with one or more of the *Proteus X* strains at titres of 1–100 or over. The readings were made after two hours' incubation at 37°C. ; the author objects to readings made after a further period of 20 hours at room temperature, on the grounds that, generally, they gave no better results and that they might actually be misleading because the sera of non-typhus patients which were completely negative after

two hours sometimes gave positive reactions after 22 hours at titres of 1–100 or even more [see the paper by SCHRÖER, above, in which a different opinion is expressed].

Some of the agglutination responses obtained in the 310 positive cases are shown in the Table, which is slightly modified for the sake of simplicity.

Agglutination responses

No. of Patients	*OX19*	*HX19*	*OX2*	*HX2*	*XK*	247	653
184	++	—	—	—	—	—	—
30	++	+	—	+	+ (H type)	—	+ (H type)
86	++	—	+	—	—	—	—
7	++	+	+	+	+ (H type)	—	+ (H type)
3	—	+	—	+	++ (O type) and +(H type)	++ (O type)	+ (H type)

The *Proteus* organisms *247* and *653* were not of the *X* type ; they were isolated from urine and a stool, respectively, in the course of investigations into typhoid fever.

It will be seen that 40 of the sera contained H-agglutinins in addition to O-agglutinins, and that all of them gave an H-type of agglutination for *Proteus 653*, which was not agglutinated by any of the 270 sera in which no H-agglutinins were found.

The author discusses the significance of the occurrence of H-agglutinins in typhus sera ; he regards this finding as being inconsistent with the various theories put forward to explain the nature of the Weil-Felix reaction ; he does not put forward any definite theory, but claims that any explanation of the reaction must take into account the not infrequent development of H-agglutinins.

John W. D. Megaw.

WINKLE, S. Untersuchungen zur Weil-Felix-Reaktion. II. Mitteilung. [**Investigations into the Weil-Felix Reaction. Part II.**] *Zent. f. Bakt.* I. Abt. Orig. 1943, Dec. 11, v. 151, No. 1, 11–17.

In this paper the author describes a detailed investigation of the agglutination reactions observed in the sera of three Russian patients in whom the reaction was of the *XK* type [as shown in the last line of the Table in the preceding paper]. These patients gave completely negative reactions with *OX19* and *OX2* ; they gave O-reactions with *XK* at titres rising to 1–800 (11th day) ; 1–800 (10th day) ; and 1–400 (11th day) ; they also gave H-reactions with *XK*, *HX19*, and *HX2*, at titres ranging from 1–200 to 1–400.

Their reactions with the two *Proteus* strains 247 and 653, not of the *X* type, were :—O-agglutination with strain 247 at titres of 1–400 to 1–800, and H-agglutination with strain 653 at titres of 1–100 to 1–200.

All the three patients had occupied the same room, and one of them had a slight rash ; they had come from the East, and the possibility of mite-borne typhus arose. Although a pure *OXK* strain was used during part of the investigation described in the preceding paper, there was no other case of O-agglutination with *XK*, and in a further series of tests with 6,158 sera from patients suffering from diseases other than typhus this type of reaction was never seen.

There was, however, a remarkable case of a German soldier from the Eastern Front who had severe septic wounds ; he gave completely negative reactions with *OX10* and *OX2*, but a strongly positive O-agglutination with *XK*, and strongly

positive O- and H-agglutination with strain 247. There were no grounds for suspecting a rickettsial infection of the mite-borne type, so it seemed likely that the patient had been infected by a strain of *Proteus* similar to 247, and that this strain gave rise to the production of the same *OXK* type of agglutination as occurs in mite-borne typhus.

In his conclusions the author expresses the opinion that the non-specific Weil-Felix reactions will rarely occur if proper technique is observed.

John W. D. Megaw.

Sofia, F. & Spadaro, O. Ricerche sperimentali sul virus esantematico. Nota II. Virus storico. [**Experimental Research into the Virus of Typhus Fever. Note II. Historic Virus.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1944, v. 4, No. 2, 353–65. English summary (8 lines).

During an investigation, in 1943, infection of the murine type was detected in patients and in rats caught in various parts of Asmara. The present note deals with the investigation of the infection in two out of the five patients seen between November 1943 and January 1944; in these two the infection is regarded as having been of the classical type; it was murine in the other three.

From one of the two patients eight successive passages were made through guineapigs; the incubation period following the original inoculation was 12–13 days, in later passages it ranged from 5 to 10 days. The duration of the fever in the animals was 5–10 days.

Blood from the second patient caused fever lasting two days, following an incubation period of 15 days, in one of the inoculated guineapigs. One of the guineapigs inoculated from this animal had slight irregular fever and when tested later was found to be fully susceptible to a murine strain of infection; from the other guineapig, which had a febrile reaction, infection was passaged through five successive guineapigs.

All but one of the seven passage guineapigs that were tested later proved immune against a murine strain, and four others tested against an historic strain were found to be immune.

The authors conclude that the historic type of infection coexists with the murine type in Asmara, and they point out that the clinical differentiation of the two forms of the disease is difficult.

[The basic significance of the orchitic and non-orchitic properties of rickettsial strains is regarded by many workers as an incompletely solved problem.]

John W. D. Megaw.

Blanc, G. & Woodward, T. E. **The Infection of *Pedicinus albidus* Rudow, the Maggot's Louse, on Typhus Carrying Monkeys** (*Macacus sylvanus*). *Amer. J. Trop. Med.* 1945, Jan., v. 25, No. 1, 33–4, 2 figs.

In two experiments the authors found that monkey lice (*Pedicinus albidus*) became infected on *Macacus sylvanus* monkeys suffering from epidemic typhus, and that the rickettsiae retained their virulence in the lice just as they have been found to do in the case of murine strains after passage through lice, and in epidemic strains after passage through fleas.

In one experiment 25 lice, collected from a monkey 10 days after recovery from experimentally-produced typhus, were ground and injected intraperitoneally into a guineapig, which reacted typically after an incubation period of three days.

In the other experiment 30 lice were collected from an infected monkey just before death; these caused a typical reaction in a guineapig after an incubation

period of five days. Two successive passages of this infection were obtained by inoculation of brain substance through guineapigs.

Rickettsiae were found in smears made from pooled suspensions of the intestinal cells of the lice in each experiment.

The authors refer to the experiments of ARKWRIGHT, BACOT and DUNCAN [this *Bulletin*, 1920, v. 15, 309], who, in 1919, infected a monkey by injecting suspensions made from 150 lice (*Pedicinus longiceps*) removed from a typhus-infected monkey (*Macacus rhesus*) just before death. Reference is also made to the experiments of ATKIN and BACOT (*Brit. J. Exper. Path.*, 1922, v. 3, 196) who showed that infected *P. longiceps* could not transmit infection by their bites to a *M. rhesus* monkey; these workers also failed to cause the disease in guineapigs by intraperitoneal injection of suspensions of infected monkey lice; they concluded that the typhus rickettsiae probably lost most of their virulence in passage through the unaccustomed host—the monkey louse.

[Although the authors claim that the results of their present experiments and of those previously carried out by BLANC *et al.* [this *Bulletin*, 1940, v. 37, 262 & 573; (*Méd. Tropicale*, 1942, v. 2, 3)], disprove the provisional view of Atkin and Bacot, they do not appear to have carried out the crucial experiment of transmitting infection by the bites of the insects. The present, and other experiments of the kind, show that rickettsiae survive and grow in the intestines of the lice and fleas, but they do not show that the infected insects can transmit infection in natural conditions.] *John W. D. Megaw.*

MÜLLER, H. K. Bericht ueber augenärztliche Befunde bei Fleckfieberkranken. [**Report on the Ophthalmological Findings in Typhus Patients.**] *Deut. Militärarzt.* 1943, Mar., v. 8, No. 3, 179–82.

The findings recorded in this report were made in difficult conditions in a War Hospital on the Eastern Front during the months of March, April and May, 1942. Only one examination could be made of each of the 125 patients who were seen, and the equipment available was of a simple kind.

All the figures in parentheses are percentages.

Externally, there was always redness of the conjunctiva, which began to fade after 8–10 days. The other external signs were: nystagmus (5) and abnormality of the pupil (9), usually in the form of contraction with a feeble reaction to light, or irregularity in the outline.

Changes in the fundus were frequent (92). The most important of these were: dilatation of the retinal veins (78), sometimes very pronounced (14); hyperaemia of the optic disk (42); blurring of the edges of the disk (51); elevation of the surface of the disk (19); specific nodular infiltrations in the retina or choroid (28); retinal haemorrhages (14); macular changes (42)—these were, oedema, folding of the surface, and loss of the central reflex; contraction of the retinal artery (12); and signs of optic atrophy (5), with or without disturbance of vision.

The typhus nodules were yellow-grey in colour and rounded in outline; the smallest were about half the diameter of an artery of the optic disk, the largest were about three times this size; the number varied from 1 to 30, usually 6 to 8. These nodules were regarded as being of great importance in differential diagnosis.

No special relationship could be determined between the severity or incidence of the ocular changes and the gravity of the attack; for instance, among 35 patients who had nodular infiltrations only 16 were suffering from severe attacks; so also oedema of the optic disk and retinal haemorrhages did not seem to be specially frequent in very severe cases. *John W. D. Megaw.*

VAINBERG, V. G. & GULAMOVA, V. P., with the collaboration of E. P. PEREKRIOSTOVA & S. G. OSTROVSKAYA. [**Results obtained with the Durand-Krontovskaya Mouse-Lung Typhus Vaccine.**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii.* Moscow. 1944, Nos. 7–8, 44–9. [In Russian.]

A group of 1,811, members of a medical personnel, were inoculated with mouse-lung vaccine. Doses of 0·5, 1·0, and 1·0 cc. were given at intervals of seven days ; 785 unvaccinated subjects served as controls. During an observation period of eight months 32 cases (1·8 per cent) of typhus occurred in the vaccinated group and 46 (5·9 per cent.) in the controls Reactions to vaccination were studied in an unstated number of subjects ; local reactions occurred in 601 cases and general in 397 (less than 1 per cent. severe).

Cases in vaccinated subjects occurred at the following times after completion of vaccination : less than 15 days—two ; 15 days to 3 months—six ; 3 to 6 months—twenty ; 6 to 8 months—three. These figures suggest that immunity falls off at 3 to 6 months after vaccination, but this time coincided with the maximum epidemic period (February–April).

The onset of disease was not modified by vaccination, so that cases are not likely to be overlooked ; the course was generally milder.

Summary of 24 vaccinated and 23 unvaccinated cases

	Vaccinated	Control
Course, days	21	28·8
Fever, days...	11·4	15·3
Type, Mild...	15	1
Moderate	9	13
Severe	0	9
Fatal	0	4

D. J. Bauer.

RAVIKOVICH, E. M., STAROVIEROVA, A. G., NEUMAN, A. S. & MAIEVSKY. [**Epidemiological Studies on the Effects of Anti-Typhus Vaccination.**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii.* Moscow. 1944, Nos. 7–8, 50–54. [In Russian.]

Medical personnel and others particularly exposed to risk of infection (transport workers, launderers, barbers, etc.) were inoculated with mouse-lung vaccine. An unvaccinated group served as a control [the numbers in the two groups are not stated]. In assessing the results the records of cases of all types of febrile illness were scrutinized to reveal undiagnosed cases of typhus. Over an observation period of one year the morbidity from typhus in the unvaccinated group was four times as great as that in the vaccinated group. *D. J. Bauer.*

RAVIKOVICH, E. M., STAROVIEROVA, A. G., NEUMAN, A. S., MAIEVSKY, M. M. & RATNER, S. M. [**A Clinical Study of the Effects of Anti-Typhus Vaccination.**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii.* Moscow. 1944, Nos. 7–8, 54–8. [In Russian.]

An analysis of 57 cases of typhus is given ; 12 were in persons who had received anti-typhus vaccination, while four were second attacks in unvaccinated subjects. The distribution in age groups was as follows :—

Age, years	Vaccinated	Unvaccinated
Up to 29	5	14
30–49	4	13
50 and over	2	4

Mild and moderate forms of the disease predominated in the vaccinated group and severe forms in the unvaccinated :—

	Mild	Moderate	Severe	Fatal
Vaccinated	4	4	3	0
Unvaccinated	2	8	21	2
,, second attack ...	3	1	0	0

The febrile period was of shorter duration in the vaccinated group :—

	4–9 days	10–14 days	15 days or longer
Vaccinated	1	9	1
Unvaccinated	3	11	17
,, second attack...	2	2	0

Complications were seen in one vaccinated case (mild bronchitis) and nine unvaccinated (all severe, including seven cases of pneumonia). Most unvaccinated patients had a petechial exanthem, while the vaccinated showed a milder roseolar eruption of shorter duration :—

Duration of eruption

	Up to 5 days	6–10 days	11 days or longer
Vaccinated	6	4	1
Unvaccinated	6	19	6
,, second attack ...	3	1	0

Disease occurred at the following times after vaccination : 11–30 days—three cases (mild), 3 to 6 months—six (five mild or moderate), 9 to 10 months—two (severe). The titre of the Weil-Felix reaction was lower in vaccinated cases and a positive reaction took longer to appear :—

	Up to 10th day			After 10th day		
Titre ...	0	≤1/200	1/400	0	≤1/200	1/400
Vaccinated ...	2	1	3	2	1	4
Unvaccinated ...	0	2	7	0	4	16
Unvaccinated, second attack				2	0	1

D. J. Bauer.

MONTOYA, J. A. Informe de un brote de tifo ocurrido en Sonsón Colombia. [**Report on an Epidemic of Typhus Fever in Sonsón, Colombia.**] *Bol. Oficina Sanitaria Panamericana.* 1944, Oct., v. 23, No. 10, 865–75, 6 figs. & 1 chart. English summary.

This report deals with an epidemic described as exanthematic typhus, but regarded as being of the murine type.

Sonsón is a district of about 1,100 square kilometres in area, situated in Colombia, between five and six degrees north of the equator, at an elevation of 2,500 metres, and with an average temperature of 14°C. The population is 35,400 mostly engaged in agriculture ; 64 per cent. of the people live in rural conditions. Typhus fever is suspected to have existed in the area for many years, but it was not till 1942 that cases were diagnosed by laboratory methods.

In the present epidemic the first recognized case occurred in December 1942, and thereafter the number of cases reported in each month from January to July 1943 were : 7, 21, 54, 70, 72, 26 and 7. Among these 257 cases there were 10 deaths, all in patients aged 40 years and over. In 119 of the cases the diagnosis was confirmed by Weil-Felix reactions at titres of 1–80 or over ; in two other cases the titre was 1–40.

Most of the cases occurred in the urban area whose population was about 9,000. About 88 per cent. of the houses in this area were infested by *Rattus rattus alexandrinus*, but no investigation of the rats or their ectoparasites could be carried out. In the school population (1,612), the infestation rate with head lice was 33 per cent., and with body lice 1·66 per cent.

Blood from 10 patients in the febrile stage was inoculated into 20 guineapigs. Positive reactions occurred in animals inoculated with the blood of two patients but the responses seem to have been very irregular. One guineapig inoculated from one patient had a scrotal reaction ; no reference is made to a reaction in the other guineapig inoculated from this patient. Blood from the second positive patient caused a febrile response in one guineapig, whose organs were used for the inoculation of three guineapigs ; one of these had a scrotal and febrile reaction ; another had a febrile reaction, and inoculation of its tissues into three more guineapigs caused very irregular febrile responses.

The disease was considered to be murine in type because of its mildness (the fatality rate was 3·89 per cent.) and the low rate of infestation by lice.

[There is no detailed information regarding the place and time of occurrence of the individual cases. The trend of incidence month by month seems to favour the view that the infection was more likely to have been louse-borne rather than flea-borne, but the author states that among the patients (number not stated) personally investigated by him, only four were infested by lice, and only head lice were found.] *John W. D. Megaw.*

POLLARD, M. & AUGUSTSON, G. F. **Serological and Entomological Survey of Murine Typhus.** *Amer. J. Trop. Med.* 1945, Jan., v. 25, No. 1, 31–2.

The authors claim that their method of detecting the presence of murine-typhus infection among rodents yields positive results "in a matter of hours." The investigation was carried out at San Antonio. The technique is as follows.

Trapped rats are placed in insect-proof bags and anaesthetized by ether ; then they are bled to death by withdrawing blood from the heart with a 5 cc. syringe. The blood serum is diluted with an equal quantity of normal saline to avoid heat-coagulation, and inactivated at 61°C. for half an hour. A complement-fixation test is carried out on serum diluted 1–10, to which 2 units of rickettsial antigen and 2 units of complement are added ; the mixture is

incubated at 37°C. for 45 minutes. Amboceptor and red blood cells are then added, and further incubation is carried out for 30 minutes.

The rat and everted bag are spread out on a white cloth under a strong light, the ectoparasites are picked up and placed in 70 per cent. ethyl alcohol for identification.

In the survey described in the paper, 6 out of 34 rats caught in theatres, and 16 out of 30 caught in food establishments, gave positive complement-fixation reactions. Ectoparasites were found on all the reacting rats and on some of the negative rats; the total catch on 75 rats (*Rattus alexandrinus*) consisted of 357 tropical rat mites (*Liponyssus bacoti*) and 44 fleas (*Xenopsylla cheopis*). None of 75 control rats caught in typhus-free localities gave a positive serological reaction, and the total catch of ectoparasites consisted of 3 fleas and 4 mites.

In experimentally-infected white rats the complement-fixation reaction became positive within one or two weeks, and remained positive up to 120 days at least; no tests were carried out after this period had elapsed.

The finding of infected rats in theatres is regarded as important; it probably explains outbreaks occurring among persons not known to have been exposed to infected surroundings. *John W. D. Megaw.*

BRIGHAM, G. D. & BENGTSON, I. A. **A Study of the Complement Fixation and Weil-Felix Reactions in Wild Rats as related to the Isolation of the Virus of Endemic Typhus.** *Pub. Health Rep.* Wash. 1945, Jan. 12, v. 60, No. 2, 29–46. [23 refs.]

By the remarkable investigations described in this report the authors have shown that the complement-fixation reaction is a much more sensitive test of the occurrence of endemic typhus fever among rats than the Weil-Felix reaction which has hitherto been so generally employed.

Sera of 1,392 wild rats from five cities in the U.S.A. yielded 46·7 per cent. of positive complement-fixation reactions against 3·6 per cent. of positive Weil-Felix responses.

From Savannah, Ga., 803 rats caught between the end of November 1941 and the end of October 1942 were tested; 329 were complement-fixation positive, and only three of these, and none of the others, were Weil-Felix positive. Brains of 311 rats from this city were inoculated into guineapigs, and from among these 27 strains of endemic typhus rickettsiae were isolated: in 24 of the 27 infective rats the complement-fixation test had been carried out and had been found positive in all but one at titres ranging from 1–32 to 1–8,192.

In a footnote the authors state that all the sera of 129 rats trapped in California, where typhus does not occur, were negative with the complement-fixation test, so they conclude that a positive reaction means typhus infection, past or present.

Among rats caught in the other four cities in which endemic typhus is known to occur the percentages of positive complement-fixation reactions in the wild rats were much higher than those of the Weil-Felix reactions.

From the tables it appears that out of a total of 44 wild rats in which the Weil-Felix reaction was positive seven gave negative fixation responses, but in six of these the Weil-Felix titre was only 1–20, and in the other it was 1–80.

Among 30 wild rats from which rickettsiae were isolated only five had a positive Weil-Felix reaction, the titres being, 1–80, 1–80, 1–160, 1–320 and 1–320.

Very interesting results were obtained from the investigation of experimentally infected white rats; 52 of these were inoculated with a typical strain of endemic typhus and then kept in 13 cages, in 12 of which one uninoculated rat was also placed. The inoculated animals were investigated in

groups of four at varying intervals after inoculation, with the following results :—Out of eight killed on the 6th to the 15th day seven gave positive Weil-Felix reactions (1–20 to 1–1,280) but none of the remaining animals, killed on the 20th to the 296 days, was positive.

All the 45 rats killed from the 6th to the 182nd day gave positive complement-fixation reactions at titres ranging from 1–256 to 1–8,192, and six out of seven surviving on the 296th day reacted at titres of 1–128 to 1–512.

Strains of endemic-typhus rickettsiae were isolated from the brains of all the rats killed up to the 182nd day, but from the remaining seven rats which were not sacrificed attempts to isolate rickettsiae from blood clots failed.

Four of the 12 control rats which had not been inoculated became infected ; these were the ones killed on the 21st, 29th, 35th and 315th days, and all of them had positive complement-fixation and negative Weil-Felix reactions on the day they were killed.

Full details of the results of the experiments are given in the report, but the above general summary is sufficient to show that the authors are justified in stating that " the complement-fixation test is the most practical means for detecting past or present endemic typhus infection among wild rats." The technique, unfortunately, is complicated. [See this *Bulletin*, 1944, v. 41, 738.]

John W. D. Megaw.

STEPHENSON, R. W. **Mite-Borne Typhus in the Anglo-Egyptian Sudan.** *Lancet.* 1945, Mar. 17, 341–2.

An attack of fever, suspected to be one of the mite-borne typhus type, occurred in an Englishwoman, aged 39, who had been living in Abu Usher, 70 miles south of Khartoum, for three weeks before the onset. No cases of clinical typhus had been reported from the area ; and later, Weil-Felix tests on a large scale showed a complete absence of positive reactions with *Proteus OX19*, *OXK*, and *OX2*, in cases of fever occurring in the locality.

The patient had very severe headache for seven days ; probably also slight fever. On the eighth day, a few papules appeared on the abdomen and back ; the temperature was 99·2°F. Two days later the papules were more numerous ; they did not extend beyond the trunk ; the temperature was 101°F. on this day, and soon it reached 103°F. with a daily remission of about one degree. The total duration of the attack was 20 days.

Neither local sore nor gland enlargement could be detected.

The agglutination titres on the 12th day were :—*OXK*, 1–2,500 ; *OX19*, 1–50 ; *OX2*, negative ; typhoid H, 1–500 ; typhoid O, 1–50. Paratyphoid A and B, and melitensis organisms were not agglutinated. The patient had been inoculated with T.A.B. vaccine recently.

Apart from one probable case of tick typhus reported by E. S. HORGAN [Report of the Sudan Medical Service, 1941], and a few cases of louse-borne typhus imported from Egypt, no other fevers of the typhus group had been reported from the Anglo-Egyptian Sudan. The authors state that " the exact type of infection in the present case remains unknown."

[The probable occurrence of mite-borne typhus in the neighbouring country, Abyssinia, has been suggested by ELSDON-DEW (this *Bulletin*, 1943, v. 40, 632) who refers to cases of typhus-like fever in which *Proteus OXK* is strongly agglutinated. ROBINSON (*ibid.*, 686), on the other hand, states that in Addis Ababa, where mite-borne typhus is not known to occur, the *OXK* reaction is strongly positive in all cases of relapsing fever. An interesting isolated case of the enigmatic occurrence of *OXK* agglutinins is discussed in an article by WINKLE (above).

John W. D. Megaw.

HICKS, J. D. **Post-Mortem Changes in Scrub Typhus.** *Med. J. Australia.* 1945, Jan. 20, v. 1, No. 3, 57–60.

This general description of the changes seen after death from scrub typhus is based on 24 autopsies carried out by the author, and 11 reported by others. The days of the disease on which 33 of the deaths occurred are shown in the table :—

Day of Disease	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
No. of Deaths	1	0	2	1	2	1	4	5	2	3	3	2	2	2	3

The Weil-Felix reaction was positive in all but seven of the 35 cases [presumably with *Proteus OXK*]. The skin and subcutaneous tissues in most cases were stained yellow with atebrin [mepacrine], but no suggestion is made that any of the changes described were due to malaria. There is no mention of the existence of differences between the findings in cases in which death occurred early and in those in which it was delayed.

The main changes were proliferation of the reticulo-endothelial tissues and infiltration of the interstitial tissues with large numbers of mononuclear cells (mostly large and small lymphocytes and macrophages, but also some plasma cells). This infiltration was most conspicuous in the heart and lungs, but it was also pronounced in the spleen, in which vasculitis was more prominent than in the other organs. The capillary endothelium throughout the body was swollen.

Some of the more frequent naked-eye changes were as follows :—The brain was usually soft, and occasionally there was oedema of the leptomeninges or injection of the surface vessels of the cerebrum. Otherwise the brain in most cases looked almost normal.

The pericardial cavity usually contained an excess of fluid : in seven cases this amounted to more than 100 cc. The only constant naked-eye change in the heart was pallor and softening of the myocardium.

The lungs showed dark-purple firm areas on the surface in some cases, but more often the whole or part of a lobe was in a state of solid congestion. " Acute infection, bronchitis or bronchiolitis was present in about one-half of the cases, extending to a bronchopneumonia in one-third." An effusion of 50–500 cc. of yellow-brown fluid was found in the pleural cavity on one or both sides in about half the cases ; and in a similar proportion there was free fluid in the peritoneal cavity, usually amounting to 100–300 cc.

The liver was enlarged in half the cases, occasionally to a very considerable degree ; it was usually pale and soft.

The spleen was always enlarged ; generally to three times the normal size ; it was dark-red, soft and friable.

The kidneys showed pale swelling of the cortex, and on the inside of this there was a narrow zone of intense congestion.

In one-third of the cases there were 2–3 cc. of clear fluid in the tunica-vaginalis sac.

Apart from the microscopical changes already mentioned the following are of interest :—In a few cases the small vessels of the brain were " shadowed by round cells," and frequently small haemorrhages were seen, especially in the pons and mid-brain. Congestion of the central veins of the lobules of the liver was usual, and the portal tracts were generally packed with large mononuclear and lymphocyte cells. Most of the normal lymphoid tissue of the spleen was replaced by masses of cell infiltration of the type already referred to. In several

cases pronounced vasculitis occurred in the spleen, this took the form of several layers of round cells beneath the endothelium of the veins.

In stained smears made from the tunica vaginalis intracellular particles were found, but they could not be diagnosed with certainty as rickettsiae.

John W. D. Megaw.

BERRY, M. G., JOHNSON, A. S., Jr. & WARSHAUER, S. E. **Tsutsugamushi Fever: Clinical Observation in One Hundred and Ninety-Five Cases.** *War Medicine.* Chicago. 1945, Feb., v. 7, No. 2, 71–5, 1 fig.

This study is based on 85 cases observed between December 1942 and June 1944, in two hospitals in New Guinea. There were only two deaths, and in both of these cases the chief microscopic lesions seen after death were perivascular cellular infiltration and degenerative changes in the vascular endothelium of the arterioles and capillaries of various organs of the body. Small foci of degeneration of the heart muscle also occurred, and in one case a few subpericardial petechial haemorrhages were seen. The authors regard the vascular lesions as of primary importance, the myocardial and pulmonary lesions being secondary to them.

In addition to the 85 patients admitted directly, 110 convalescents were also studied.

In most cases there were prodromata for a few days before the onset which was gradual more often than abrupt with chill. The fever lasted 10–30 days; the usual duration was 14–21 days. An eschar with local lymphadenitis occurred in 80 per cent. of the cases; any part of the body might be affected, but the favourite sites were the scrotum, axillae, and groins. The spleen was usually palpable.

A generalized, red, maculo-papular rash was seen in almost all the cases. It appeared between the fourth and the eighth day; the spots were most abundant on the trunk and limbs; the wrists and ankles were rarely affected.

Among 60 patients examined by X-rays during the second week, seven showed evidence of atypical pneumonia, and two of empyema. There was a fall in the blood pressure; by the end of the first week the systolic reading was usually 90 mm., and the diastolic 60 mm. There was no evidence of myocardial failure. Electrocardiograms were made during the fever in nine patients and during convalescence in 21; no abnormality was found in any case.

The red-cell counts were usually 4–5 million per cmm.; the leucocytes ranged from 4,000 to 6,000; the granulocyte-lymphocyte ratio was 6 : 4.

The highest titre of agglutination of *Proteus OXK* was reached about the 20th day; the reaction was almost always positive. The Widal test was useless as a means of excluding typhoid fever; it was frequently positive in the patients, all of whom had been inoculated with T.A.B. vaccine.

Four patients had very severe headache, delirium, and stiffness of the neck. One-third had partial temporary deafness, which disappeared in 4–8 weeks.

No drug treatment had any effect; sulphonamides, given to patients who had pneumonia, caused no improvement. Absolute rest, adequate fluid intake by the mouth, and a generous diet were regarded as important. Intravenous plasma, given slowly and in moderate quantity, appeared to have some value in certain cases.

The authors specially insist that no suggestion of heart disease should ever be made to the patient, otherwise an obstinate cardiac neurosis may result. Permanent sequelae are regarded as unlikely to occur.

John W. D. Megaw.

LEVINE, H. D. **Cardiac Complications of Tsutsugamushi Fever (Scrub Typhus) : an Investigation of their Persistency.** *War Medicine.* Chicago. 1945, Feb., v. 7, No. 2, 76–81, 1 fig. [Refs. in footnotes.]

The author describes mite-borne, typhus-like, tsutsugamushi fever as being the disease with the highest mortality likely to be encountered by troops in the Australasian Islands. The pathology of the disease is stated to be a widespread perivascular infiltration of lymphocytes and plasma cells. The disease is said to have " none of the tendency of some of the other rickettsioses to produce thromboses or haemorrhages."

[This point of difference cannot be accepted as being of general applicability ; in the paper by BERRY *et al.* (above) subpericardial haemorrhages are mentioned as occurring in one of the two fatal cases, and haemorrhages in various organs are described in two other recent papers (LIPMAN *et al.*, this *Bulletin*, 1945, v. 42, 371, and HICKS above, p. 554). The fatality rate in the present series is not mentioned ; if it was as low as in the group dealt with by BERRY *et al.* the infection cannot have been virulent.]

The investigation was undertaken to find whether cardiac changes were likely to persist after attacks of the disease. The records of 130 convalescent patients seen between July 1942 and February 1944 were reviewed, and these were found satisfactory except in 15 cases. The average interval between the onset of the disease and the arrival of the convalescents for cardiological examination was about nine weeks.

During early convalescence 86 of the patients had complained of dyspnoea or palpitation ; in 37 cases persistent tachycardia, or hypotension, or effort intolerance, was mentioned as having occurred during the period of evacuation through the chain of hospitals ; on admission to the general hospital, 34 still had symptoms which they, or their medical officers, regarded as evidence of cardiac involvement.

Only four of the patients were found to have physical signs of cardiac abnormality, and in three of these the signs consisted of systolic murmurs the fourth patient had signs of cardiac enlargement.

Electrocardiographic examination was carried out on 118 patients, and only seven showed major abnormalities, of which five proved to be transient. A control observation on 200 persons suffering from gonorrhoea was made, and four were found to have abnormalities of the same types, so there was no clear evidence that tsutsugamushi fever was responsible for the electrocardiographic aberrancies.

Among 63 patients investigated by X-ray only five showed any cardiac changes, and none of these was really significant.

The blood pressure was within the normal range (110-140 systolic and 68–90 diastolic) in 126 of the 130 patients ; in the other four the systolic readings were 90–100, and the diastolic 60–70.

By an analysis on the lines laid down for the diagnosis of functional heart disease by LEWIS and others it was found that at least 49 of the patients were suffering from the syndrome variously described as soldier's heart, neuro-circulatory asthenia, effort syndrome, etc. ; this condition is known to be a common sequela of such diseases as typhoid fever, pneumonia, influenza, and dengue.

There was evidence that a suggestion had been conveyed to some of the patients during their stay in hospital that tsutsugamushi fever was likely to cause permanent disease of the heart, and that in this way a " practically ineradicable impression " had been implanted in their minds.

Of the 130 patients, only six were evacuated to the U.S.A., and in only two of these the reason was cardiac disease ; five were discharged to " limited

service " ; two were transferred to a naval hospital ; the remaining 117 were returned to full military duty.

The circulatory disturbances associated with the disease are regarded by the author as being largely due to poor vascular tone associated with the generalized vasculitis, which is the chief element in the pathology of tsutsugamushi fever.

[These findings are important ; they agree closely with those of the authors of the preceding paper, and they go to show that mite-borne typhus has no greater tendency to cause permanent damage to the heart than other fevers of the typhus group of corresponding severity.] *John W. D. Megaw.*

SEN GUPTA, P. C. **A Case of Typhus Fever complicating Kala-Azar in Calcutta.** *Indian Med. Gaz.* 1944, Dec., v. 79, No. 12, 602–3.

An Indian girl, aged four years, had almost completed a course of treatment for kala azar and had been free from fever for more than a month, when suddenly she was attacked by fever which remained high for 5 or 6 days. Seen at the end of this time she had low fever and a profuse dusky erythematous blotchy rash, chiefly on the legs, but also on the abdomen and arms, not on the face. Neither necrotic ulcer nor marked enlargement of the lymph glands was seen. Recovery was uneventful ; the rash had disappeared 11 days after it was first seen.

Proteus OXK was agglutinated at a titre of 1–400 on the seventh day of the illness ; the titre fell to 1–25 on the 10th day ; and the reaction was negative on the 14th day. Neither *Pr. OX19* nor *Pr. OX2* was agglutinated.

The type of the agglutination response was regarded as confirming the diagnosis of " typhus caused by a strain of rickettsia similar to that of tsutsugamushi fever."

The anomalous nature of the reaction is attributed to the well-recognized fact that patients suffering from, or convalescent from, kala azar show very poor immunity reactions to other infections.

[No mention is made of the locality in which the patient was living before the onset ; presumably she was being treated as an out-patient at the Kala Azar Clinic.] *John W. D. Megaw.*

YELLOW FEVER.

BRITISH GUIANA. **Report on the Yellow Fever (Anti-*Aedes aegypti*) Service of the Medical Department, British Guiana, for the Year 1944** [BEVIER, G., M.D., Chief Officer]. MS., 12 typed pp., 3 charts.

The staff of " The Anti-*Aedes aegypti* Service " consists of one chief officer, one medical officer, two supervisors, two supervising inspectors, 17 chief inspectors and some 200 junior employees. The staff during the past year has laboured to diminish the risk of yellow fever in British Guiana, especially in Georgetown, and, as the report shows, their efforts have been attended with considerable success ; for example, the breeding of *Aëdes* in roof gutters has been greatly reduced. An interesting part of the report is that which deals with the results of examining aeroplanes and trains for the presence of mosquitoes. Altogether 362 aircraft were inspected during the year ; south-bound aircraft came from Trinidad, while the majority of those north-bound came from Paramaribo, but there were a few from Manáos. Two hundred and fifty-five of these aircraft were found to be free of insects, the remaining 107 yielded a total of 16 mosquitoes (seven *Culex quinquefasciatus* [*C. fatigans*], eight *Mansonia*

titillans and one *Aëdes taeniorhynchus*. The examination of trains entering Georgetown from the east coast yielded considerable catches, and BEVIER is of the opinion that trains constitute "a constant source of re-infection" and that "*Anopheles darlingi*, the malaria carrier, was also being brought into Georgetown by this route." During the year, 177 "catches" were made; the species most frequently found in the trains during the year were *Culex quinquefasciatus* (881 specimens), *Aëdes taeniorhynchus* (798), which appeared in April and November, and *Anopheles tarsimaculatus* (728), which were most common in May, June and July. There were 412 other *Culex* mosquitoes including 63 *C. nigripalpus*. Only six bromeliad breeders were found, one *Wyeomyia* and five *Microculex*. No cases of clinical yellow fever were discovered during the year. *R. M. Gordon.*

HARGETT, M. V. **The Control of Yellow Fever.** *Puerto Rico J. Pub. Health & Trop. Med.* 1944, Sept., 3–45, 2 maps & 1 chart. [Refs. in footnotes.]

A general summary of some of the literature with special reference to the control of yellow fever. *E. Hindle.*

PLAGUE.

WAGLE, P. M. **Sulphadiazine in the Treatment of Bubonic Plague.** *Indian Med. Gaz.* 1944, Dec., v. 79, No. 12, 585–9.

This was a well-conducted alternate-case trial of sulphonamides in plague—sulphathiazole which has already been shown effective, and sulphadiazine which was a new venture. Altogether 180 cases of genuine plague were treated in strictly alternate succession 89 with sulphathiazole and 91 with sulphadiazine, with no differentiation of septicaemic and non-septicaemic plague and with mortalities of 33·7 and 21·9 per cent. These favourable mortalities may be compared with a previous trial of iodine intravenously, where the mortality for 165 patients was 58·1 per cent. The newer drug, sulphadiazine, was administered in initial dose of 4 gm., followed by 2 gm. four hours later, and 1 gm. every four hours. The patient received 10 gm. of the drug on the first day and 6 gm. on subsequent days. Still larger doses were given in some very serious cases. All the patients treated with sulphadiazine and some of those treated with sulphathiazole received part (2 gm.) of the initial dose intravenously; all other doses were given by mouth. In no case was the drug given for more than 12 days.

The percentage mortalities mentioned are for all types of plague case, and by excluding those moribund on admission, the mortalities become 12 per cent. for sulphadiazine, 21 per cent. for sulphathiazole and 53 per cent. for iodine. Patients were encouraged to drink plenty of water to secure a urinary output of at least 1,200 to 1,500 cc. daily and no serious toxic reactions occurred.

W. F. Harvey.

SAVINO, E., KUHN, M. J. & MORALES VILLAZON, N. Presencia de lesiones de "Resolving-Plague" (=peste crónica) en ratas grises. [**"Resolving Plague" in Grey Rats.**] *Rev. Inst. Bacteriológ. "Dr. Carlos G. Malbran."* Buenos Aires. 1944, June, v. 12, No. 2, 190–94, 4 pls. [16 refs.]

Examples of chronic plague are very rare but have a special interest because they furnish evidence of continuance of infection after the cessation of an epizootic and possibly of the means by which infection is carried over through

a non-plague season to the next plague season. The present case of chronic plague was the only one that had been met with among 120,000 rats examined between 1938 and 1943. The rat had been caught alive towards the end of a great epizootic and, at examination, showed little abnormality except for an encapsuled abscess in the spleen filled with caseous material. No plague bacilli were found in the purely splenic tissue but plague bacilli were abundant in the abscess. This then is to be classed as a case of " resolving plague " in which living plague bacilli still survived. *W. F. Harvey.*

BACILLARY DYSENTERY.

JACOBY, A. H., LOUDON, J. R., WYNE, P. S. & FAILMEZGER, T. R. **The Diarrhea Problem in a New Guinea Base.** *Bull. U.S. Army Med. Dept.* 1945, Mar., No. 86, 70–78, 4 figs.

Among 1,400 patients admitted to hospital with diarrhoea, bacteriological examination by use of the rectal swab, yielded dysentery bacilli in 391, salmonella organisms in 37, and other non-lactose fermenters of doubtful pathogenicity in 65. [The culture medium used is not stated.] Nearly 80 per cent. of the dysentery organisms were Flexner types, and only 3·6 per cent. were Shiga strains. More than half the diarrhoeal cases were classified as mild infections, irrespective of whether a specific pathogen was isolated or not. Different groups of cases were treated with sulphaguanidine alone (3·5 gm. four-hourly for one day : then 3·5 gm. t.i.d.) ; a course of sulphaguanidine followed by sulphaguanidine 3·5 gm. plus sulphadiazine 1 gm. t.i.d. ; and sulphaguanidine 3·5 gm. plus sulphathiazole 1 gm. four-hourly for one day and then t.i.d. If stools were still positive after a six-day course, a second more intensive course was given. In the dysentery infections, the best results were apparently obtained with the sulphaguanidine-sulphathiazole mixture, although there was little difference in the average stay in hospital for the three groups. In each of these groups the stay was half or less than that required for a group treated irregularly with "miscellaneous sulphonamides". The sulphaguanidine-sulphathiazole mixture was superior to sulphaguanidine alone in the treatment of non-specific diarrhoea. To prevent spread of infection in the hospital, each patient was given a card instructing him about personal hygiene, sterilization of all mess-gear was insisted upon, fly control was practised, and food-handlers were kept under medical and bacteriological supervision. *Robert Cruickshank.*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

ADAMS, A. R. D. **Amoebiasis with special reference to Treatment.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1945, Mar., v. 38, No. 4, 237–44 [26 refs.] Discussion 244–58 [HARGREAVES, W. H. ; SCOTT, H. H. (President) ; PRIEST, R. ; MANSON-BAHR, P. ; LOURIE, E. M. ; HOARE, C. A. ; SMYLY, H. J. ; WILLMORE, J. G. ; HODGE, E. H. V. & DREW, R. ; ADAMS, A. R. D. (in reply)].

From his experiences of the treatment of amoebiasis, ADAMS until recently believed that the elimination of a gut infection with *E. histolytica*, in all but a small proportion of cases was merely a matter of routine. A few preliminary injections of emetine were followed by a three-weeks' blunderbuss assault on

the parasites with auremetine, stovarsol, bismuth subnitrate by the mouth, and retention enemata of chiniofon. He could remember only one case which proved refractory to treatment. In 1943 a batch of 30 cases arrived from the Indian and Burma theatres of war. The patients were bed-ridden, emaciated and were passing blood-stained stools containing many amoebae. They proved to be entirely refractory to routine treatment whilst some actually relapsed within a few days. Repetition of the treatment in others eventually proved successful, but a residue were still infected, despite any course of treatment. Amongst other methods were the oral administration of sulphaguanidine, sulphasuxidine, rectal administration of these compounds in cod liver oil, and retention enemata of mepacrine hydrochloride. All produced temporary amelioration, but none showed evidence of specific action on the causative organism.

There appeared to be two explanations of this intractability. Either the men were infected with an unusually virulent and resistant parasite, or they had been excessively dosed with emetine long after it was plainly evident that this drug would not sterilize them. As a result the amoebae had become resistant to emetine.

It is possible also that amoebae thus rendered resistant to emetine become at the same time less amenable to any other available drugs. It therefore appears that the whole subject of the treatment of amoebiasis should be approached from a new aspect.

Hargreaves described his experiences with patients suffering from chronic amoebiasis, most of whom had already proved refractory to treatment in other hospitals in England. Some had been under continuous treatment for many months, sometimes as long as two years. He did not criticize the manner in which emetine had been used by medical officers under difficult circumstances, for some patients had actually become acutely ill during the course of 21-day blunderbuss treatment and he had been forced to inject this drug to relieve them. He sincerely believed that it would have been wiser to invalid most of these chronic cases earlier. He believed in providing as full a diet as possible and in giving due attention to the psychological aspects of this depressing disease. Until March 1944 he had employed the well-known standard treatment—six daily injections of grain 1 of emetine followed by E.B.I., together with chiniofon retention enemata for 12 days and lastly stovarsol or carbarsone 4 grains twice daily for 12 days. This was compared with Adams's three-weeks' course and no advantage was found in the latter (Liverpool) treatment. In a series of 70 cases (54 invalided from India) giving half of them the standard and the other half the Liverpool course—of these 48 were apparently cured and of the remaining 22 (16 of which were from India) 12 improved, but relapsed after a few days and 10 were unchanged.

In addition to the drugs already mentioned (with the exception of diodoquin and mepacrine) he had tried extract of kurchi bark, kurchi bismuth iodide, stilbamidine, sulphaguanidine and sulphasuxidine without success.

Injection of 100,000 units of penicillin intramuscularly, followed by 33,000 units three-hourly up to a total of 1,000,000 units was successful in saving the life of one particularly critical case. He put on four stones in weight, but though his physical condition had improved beyond recognition, this form of treatment had no effect upon the *E. histolytica*. In the laboratory it had also not been possible to demonstrate that penicillin had any action upon this organism.

On the assumption that secondary bacterial invasion plays a large part in the distressing symptomatology, Hargreaves now gives a course of sulphasuxidine, 60 gm., in conjunction with penicillin. This is followed by a standard anti-amoebic course lasting three weeks. When fit for convalescence, the patients are discharged for one month prior to re-examination. He felt sure that the

attack on secondary infections rendered the severe refractory cases more amenable to subsequent treatment with specific drugs.

Scott drew attention to other drugs, notably the seeds of *Brucea javanica*, generally known as kô-sam.

Priest had had much the same experiences as Hargreaves. A trial of diodoquin was proving encouraging, but that was always the case with any new drug in amoebic dysentery. It was also remarkable that even after much emetine or auremetine a patient might suddenly develop amoebic hepatitis.

Manson-Bahr reiterated his conviction that repeated injections of emetine in successive courses in debilitated patients only served to produce an emetine-resistant strain of *E. histolytica*. The physical condition of the patient was all-important as amoebic dysentery was the outcome of the resistance of the tissues to invasion by the amoebae. In many of the so-called incurable cases, minutiae of treatment had not been observed and emetine-bismuth iodide was often exhibited in keratin-coated capsules which were not absorbed. In several so-called resistant military cases from India he had obtained success by giving this drug in an absorbable form.

Lourie referred to the experimental production of emetine-resistance in cultures of *E. histolytica*.

Hoare brought forward some evidence that the small race of *E. histolytica* may eventually prove to be non-pathogenic to man.

Hodge and Drew concentrated on the criteria of cure in amoebiasis. These are :—

(1) General constitutional recovery.
(2) Absence of thickening or tenderness of the colon and of tenderness or enlargement of the liver.
(3) The absence of vegetative or cystic forms of *E. histolytica* in at least 10 specimens of faeces.
(4) The absence of active ulceration on sigmoidoscopic examination. Sometimes radiological examination with double contrast barium-air enemata is of value in demonstrating ulceration out of reach of the sigmoidoscope.
(5) The appendix may constitute the nidus of infection and appendicectomy prove necessary to effect a cure.

P. Manson-Bahr.

Lamb, W. L. & Royston, G. R. **Chronic Amoebiasis : Investigation and Treatment.** *Lancet.* 1945, Apr. 14, 455–7, 1 chart. [11 refs.]

After pointing out the importance of early recognition and thorough treatment of the large numbers of persons with amoebiasis who may be expected to return to Britain from overseas for some years to come, the authors classify the drugs which have been employed in the treatment of this condition into four groups. The first group embraces preparations of emetine, given either by injection or by mouth ; the second, organic arsenicals for oral administration ; the third, preparations of the iodo-oxyquinolin-sulphonic acid series given either orally or by rectal injection ; and the fourth, a number of other compounds—bismuth and kurchi by oral, and eusol and silver nitrate by rectal administration.

They discuss briefly the various combinations of these employed by various workers in an endeavour to sterilize chronic relapsing amoebiasis, and point out that with any of them there is a good chance of effecting a " cure," though there is disagreement as to which of them is the best.

In five months of 1944, the authors investigated and treated an unselected group of 81 men, all but three of whom had been invalided to the United Kingdom for amoebiasis, the majority coming from India and having had previous treatment for a varying number of relapses. All cases with a suggestive history of amoebiasis were sigmoidoscoped, and scrapings were taken from any

ulcers or suspicious-looking areas. The stools were examined microscopically and cultured [on how many occasions and whether for protozoa or for pathogenic bacteria is not stated].

In three cases *Entamoeba histolytica* were found in the stools, but not recovered sigmoidoscopically ; in four, *E. histolytica* were obtained sigmoidoscopically but not on stool examination. Cases with amoebic ulceration [and presumably parasite-positive] received a 21-day course of treatment consisting of " Auremetine " and bismuth subnitrate by mouth on the odd days of the course, and on the even days " Stovarsol " and bismuth subnitrate by mouth, while retention enemata of " Quinoxyl " were also given, after a preliminary rectal wash-out with sodium bicarbonate solution. All cases during treatment received a full light diet. Three days after the completion of treatment stools were examined after saline purges ; if no parasites were found the patients went to a convalescent home for two weeks and then returned for reinvestigation. If all was well they returned to the home for a further two weeks' convalescence before going on to a rehabilitation centre ; at the end of a further three months each case was again reviewed.

The authors state that 29 cases of proved dysentery received the above course. Of these 26 were chronic relapsing cases with histories ranging from five months to five years, and having undergone much previous treatment ; three were fresh, previously untreated, cases.

The three previously untreated cases have not been adequately followed up, while among the 26 previously treated chronically relapsing cases the authors infer that the relapse rate after treatment was 91 per cent., basing this figure on those cases which were adequately followed up. They state that the relapse-rate among these was almost directly proportional to the time of post-treatment observation.

[The number of cases adequately followed up, from the authors' own account, appears to be less than half of the 29 treated. The reviewer has to confess that he cannot follow the figures given and arrive at the same totals as the authors. It is apparent that percentages based on such small numbers may be grossly misleading.] *A. R. D. Adams.*

SODEMAN, W. A. & LEWIS, B. O. **Amebic Hepatitis.** *Amer. J. Trop. Med.* 1945, Jan., v. 25, No. 1, 35–9.

The failure of a large number of the current textbooks to delineate this problem clearly, or to emphasize its importance, has instigated this paper. Absolute diagnosis should be based upon demonstration of the cause of the disease, but in hepatic amoebiasis diagnosis and treatment are almost invariably carried out without the demonstration of the presence of *Entamoeba histolytica* in the liver or its discharges.

The records of patients with such diagnosis at the New Orleans Charity Hospital and the Marine Hospital during the past five years have been searched. There were 81 patients, 58 with amoebic hepatic abscess and 23 with amoebic hepatitis. In the 58 with diagnosis of abscess, 12, or approximately 20 per cent., presented themselves with symptoms and signs concentrated round the right lower pulmonary area.

Acute and chronic conditions including pleural pain, pneumonia, and, in two, pleural effusion, focussed attention to the area above the diaphragm. One patient had been treated first for atypical pneumonia, and subsequently for idiopathic pleural effusion, for seven months before hepatic changes were found, but the entire group showed, in addition to the pulmonary findings, evidence of hepatic involvement. In the remaining 46 the presenting complaints pointed

to the liver, with enlargement, tenderness, bulging, occasional fever, chills, leucocytosis in 81 per cent., and, in 70 per cent., distinct and sudden onset.

In differential diagnosis bronchogenic carcinoma, bronchiectasis, basal pneumonia, atypical pneumonia, tuberculosis, empyema, and pleural effusion of possible tuberculous or malignant origin may need consideration. Other probabilities are associated with a purely hepatic picture of cirrhosis, malignant disease of the liver, acute and chronic cholecystitis, peptic ulcer, infective hepatitis, pyogenic liver abscess and hydatid cyst. But this formidable list does not represent all the conditions with which hepatic amoebiasis may be confused. In temperate countries some of these conditions are admittedly many times more common than hepatic amoebiasis, but this is hardly true in tropical areas, where it is of much more frequent occurrence, though this possibility does not always spring to mind. *Awareness of the probable occurrence of hepatic amoebiasis* was the most important single factor in directing the early establishment of the diagnosis. Without it the diagnoses were either late or accidental. The data and their frequency in 58 patients diagnosed as abscess were :—

1. A history of diarrhoea or dysentery, or its presence with hepatic picture ... ... 19 (32·7 per cent.)
2. The presence of *E. histolytica* in the faeces ... 10 (29·4 per cent.)
3. X-ray appearance of fixed right diaphragm, bulging of the diaphragm, especially centrally and anteriorly, bulging of the right diaphragm, with pleural or pulmonary involvement or evidence of hepatic enlargement ... ... 47 (81 per cent.)
4. Chocolate sauce pus (*a*) from rupture or (*b*) by aspiration from the pleura or liver ... ... 55 (94·8 per cent.)

Colonic infection probably always precedes the hepatic lesion, but is usually not clinically active. In only 32 per cent. was a history of diarrhoea obtainable. In 11 per cent. the onset was with diarrhoea.

In only 11 (19 per cent.) were X-ray positive findings absent ; in 15 (26 per cent.) characteristic diaphragmatic bulging was seen ; in 18 (31 per cent.) elevation and impaired movement of the diaphragm, and in 14 (24 per cent.) there were similar evidences in association with changes in the pleura and right lower lobe of the lung. These findings constitute important guides for aspiration of pus. In 11 per cent. rupture occurred into a bronchus, producing typical sputum. In 15 (26 per cent.) X-ray appearances were insufficient to warrant tentative diagnosis. Of 18 with elevation of the diaphragm, in 11 pus was obtained by aspiration and in five at operation. Further development of, and more widespread use of, the complement-fixation test is sorely needed in hepatic disease.

The history, and physical examination centred around a hepatic clinical picture, are not by themselves sufficient to warrant the increasing use of emetine as a therapeutic test, until other diagnoses are improbable and awareness of the possibility of amoebic infection has led to tests for colonic amoebiasis—X-ray examination of the liver area, a complement fixation test, or exploration for pus. In this group 78 patients were treated with 6 to 12 grains of emetine hydrochloride. Only once did untoward symptoms ensue and these were cardiac. *P. Manson-Bahr.*

ANDERSON, H. H. & CHUAN, T. T. K. **Comparative Amebacidal Activity of Phenyl Arsine Oxide (Mapharsen), related Arsenicals and other Agents.** *Amer. J. Trop. Med.* 1944, Nov., v. 24, No. 6, 367–9. [14 refs.]

Of the group of agents tested *in vitro* on cultures of *E. histolytica*, mapharsen was most effective in that it killed the amoebae in 48 hours when in dilutions of

1 in 20,000 to 1 in 30,000. Of the other substances tested, 2,4-dihydroxyphenylarsonic acid was effective in 1 in 8,000 dilution and N,N′-disodium formaldehyde bisulphite-3, 3′-diamino-4, 4′-di(β-hydroxyethoxy)arsenobenzene in a dilution of 1 in 3,000. Other allied substances had no appreciable effect. The amoebicidal activity of emetine was tested as a control. To be effective, concentrations greater than 1 in 25,000 reported by DOBELL and LAIDLAW [this *Bulletin*, 1927, v. 24, 363] were required. The culture technique in the coagulated egg medium of these two observers was employed. In a table the various results obtained are set forth. *C. M. Wenyon.*

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

COHEN, A. G. **Relapsing Fever in Panama: Report of Six Cases.** *War Medicine.* Chicago. 1945, Jan., v. 7, No. 1, 19–22, 2 charts. [12 refs.]

In the spring of 1942, during a period of eight weeks, six patients with relapsing fever were seen at the Panama hospital where the author was serving. All showed the usual clinical symptoms, and the benignity of the course of the disease was consistent with previous observations. The only two cases showing a relapse are described in detail.

The presumptive exposure of three of the patients to infection on only one night suggested an incubation period of 12 to 14 days. The disease is almost certainly the tick-borne type of relapsing fever endemic in Central America.

The intravenous injection of 0·4 to 0·5 gm. of neoarsphenamine given soon after the diagnosis was established, followed by a second injection after 3 to 5 days, caused the disappearance of all spirochaetes within 24 hours after the first injection and there were no relapses after treatment. *E. Hindle.*

PAVLOVSKY, E. N. *Dyromys nitedulus* **Pall. as a possible Reservoir of the Virus of Tick Relapsing Fever.** *C. R. Acad. Sci. URSS.* Moscow. 1943, v. 39, No. 7, 286–8. [Summary taken from *Rev. Applied Entom.* Ser. B. 1945, Feb., v. 33, Pt. 2, 14–15.]

Details are given of experiments showing that *Dyromys nitedulus*, a small rodent widely distributed in Central Asia and European Russia, is very readily infected with the spirochaetes of tick-borne relapsing fever. The infections were produced by inoculation of the blood of guineapigs harbouring a Tadzhikistan strain transmitted by *Ornithodoros tholozani*, Lab. & Mégn. (*papillipes*, Bir.) or a Georgian strain transmitted by *O. verrucosus*, Olen., Zas. & Fen., or by the feeding of examples of *O. tholozani* infected with another Tadzhikistan strain. Most of the animals survived the infection and the spirochaetes persisted in their blood for up to 32 days.

In nature, *D. nitedulus* is associated with woods and the species of *Ornithodoros* are not, but it might serve as host for *O. tholozani* or *O. tartakovskyi*, Olen., in Central Asia in oases or along the edges of woodland in the mountains, and thus act as a reservoir of relapsing fever.

PAVLOVSKIĬ, E. N. [**A Register of the Spirochaetes of Tick Strains of Relapsing Fever in the USSR and Neighbouring Countries.**] *Probl. region. Parasit.* Moscow. 1939, v. 3, 19–35, 9 figs. [12 refs.] [In Russian. English summary pp. 35–44.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1945, Feb., v. 33, Pt. 2, 17–18.]

Laboratories in the Russian Union have maintained a number of strains of spirochaetes of tick-borne relapsing fever for years by keeping them in live

examples of *Ornithodoros tholozani*, Lab. & Megn. (*papillipes*, Bir.), a method that avoids the expense of repeated passages through guineapigs. The ticks are long-lived and have been shown to preserve virulent spirochaetes for 7–8 years, and any strains required for experiment can be obtained by feeding the ticks on guineapigs.

Since the rich collection of spirochaetes already made is continuously being increased by the finding of further batches of spontaneously infected ticks, the author has begun the publication of a series of records of the strains isolated from ticks in the Russian Union and adjacent countries in places where relapsing fever is prevalent. This paper is the first of the series and also contains details of the records desired. Each should include the identity of the tick, a general geographical description of the place where it was found, with a map, details of the biotope with illustrations, the dates of collection and demonstrations of infectivity of the tick, the species of animal used to demonstrate its infectivity, the pathogenicity of the strain to man, and the names of those responsible for each phase of the work. In this first series, particulars are given relating to ten strains of relapsing-fever spirochaetes isolated from *O. tholozani* in Tadzhikistan and southern Kirghizia.

Pavlovskiĭ, E. N. & Aluimov, A. Y. [**Tick-borne Relapsing Fever in Southern Kirghizia.**] *Probl. region. Parasit.* Moscow. 1939, v. 3, 72–98, 4 figs. [In Russian. English summary.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1945, Feb., v. 33, Pt. 2, 18.]

During investigations on tick-borne relapsing fever in the south-western part of the Kirghiz Republic in July and August 1935, many engorged and unfed nymphs and adults of *Ornithodoros tholozani*, Lab. & Mégn. (*papillipes*, Bir.) were found in several neighbouring districts in artificial caves in which grain was stored or sheep were kept in winter, in burrows of rodents and tortoises, and in holes inhabited by birds, and engorged females had previously been taken in a house. Ticks from a porcupine burrow and burrows of *Meriones erythrourus* transmitted spirochaetes to guineapigs on which they were fed. No natural infection was found in small rodents taken in one of the districts, but an example of *M. erythrourus* was experimentally infected with a strain of spirochaetes isolated from ticks, which suggests that this gerbille may be a local reservoir.

Most of the local cases of relapsing fever were evidently tick-borne, since the blood of the patients was infective to guineapigs. The disease occurred almost exclusively in spring and summer, and a man was experimentally infected with it by the feeding of a batch of *O. tholozani* taken in one of the caves.

Experiments with several strains of relapsing fever spirochaetes from various parts of Central Asia showed that they could not be differentiated by the character of the disease they produced in guineapigs or, with any reliability, by cross-immunity tests.

Sheldon, W. H. **Lesions of Muscle in Spirochetal Jaundice (Weil's Disease : Spirochetosis Icterohemorrhagica).** *Arch. Intern. Med.* 1945, Feb., v. 75, No. 2, 119–24, 4 figs.

A description of the lesions encountered in 16 biopsy specimens from muscles of the calf of seven patients with Weil's disease seen recently at Grady Hospital, Atlanta, Georgia.

One of the patients was a white man, the others were negroes. All had a history of exposure to rats. Varying degrees of jaundice and enlargement of the liver were observed in every instance. The general clinical symptoms were typical ; one case was fatal on the third day.

The biopsy specimens were taken at various stages ranging from the 10th to the 66th day of the disease. Early but definite lesions were present in the muscle on the 10th day, and clinical relapses were marked by the appearance of new lesions in addition to the existing older ones. The morphological characteristics of these lesions are considered to be rather typical of the disease. The lesions always involved only a part of one muscle fibre and sometimes two or three adjoining fibres showed focal involvement. The earliest change consisted in the appearance of small and medium-sized vacuoles in the cytoplasm of the striated muscle fibre. This tended to become confluent and simultaneously the cytoplasm of the fibre in the involved area lost its cellular detail. The fibrils disappeared but at this stage there was no significant cellular reaction or haemorrhage, thus distinguishing it from Zenker's degeneration. The lesions were repaired from about the 17th day onwards by regeneration of the striated muscle without significant participation of the adjacent interstitial connective tissue. At this stage no appreciable fibrosis or scarring occurs, but in more severe lesions repair is accompanied by fibrosis. The author examined control sections of gastrocnemius muscle from patients suffering from various other diseases, but no lesions resembling those of Weil's disease were observed. It is suggested, therefore, that biopsy of the calf muscle may be a useful measure in the diagnosis of Weil's disease.

In an appendix, details are given of the examination of biopsy specimens from 12 other patients with suspected Weil's disease. In five cases lesions of Weil's disease were found, although in only one of these patients was there a positive agglutination test. One case was doubtful and the other six, typhus (1), infectious hepatitis (3), reaction to arsphenamine therapy (1), and atypical pneumonia (1), gave negative results. *E. Hindle.*

LEPROSY.

Ignacio Chala H., J. & Lleras Restrepo, F. Estudio experimental sobre algunos bacilos acido-resistentes obtenidos de material leproso humano. (Nota preliminar.) [**Experimental Study of Acid-fast Bacteria isolated from Cases of Human Leprosy.**] *Publicaciones del Instituto Federico Lleras Acosta.* Bogota. 1944, Nov., 31 pp., 10 figs. [4 pages of refs.]

Six strains of acid-fast bacteria isolated from leprosy lesions in man have been cultivated and these form the subject of this work. The authors have investigated their pathogenicity and the results of inoculation experiments in laboratory animals: 381 white mice, 96 guineapigs, 66 rabbits, 11 *Macacus rhesus* [*Macaca mulatta*], 41 fowls and pigeons. The article is so crowded with information that abstract is hardly possible; those interested must consult the original. The English summary is so full and so accurate, compared with the text, that there will be little or no difficulty in doing this.

The sources of the six strains, the method of cultivation and characters of the growths are detailed. Doses of the bacilli, suspended in saline, varying between 0·01 and 3·0 cc. were inoculated by various routes, intradermal, subcutaneous, peritoneal, by mouth, and by nasal insufflation. The macroscopical and histological findings are described. Serological reactions (fixation of complement) were tested before the animals received their injections and again subsequently. In the case of the latter, the Lleras-Acosta strain gave a positive in 30·7 per cent., a culture of an organism obtained from the sternal marrow 19·2, Duval's organism 7·6, Kedrowsky's 2·3, one sent from the National Institute of Health, Washington, 12·3, and one from a human leproma 36·1 per cent.

Besides inoculating the healthy animals with the various bacteria, the authors, in some cases, made the inoculations after performing splenectomy to see if sensitization or greater susceptibility to infection resulted therefrom, but with negative results. Animals still alive are being reinoculated and kept under observation and any definite findings are to be reported later. Photographs of animals presenting the grosser lesions are reproduced together with photo micrographs of the histological changes. *H. Harold Scott.*

CERRUTI, H. Considerações histopatológicas sôbre a lepra da mucosa nasal. [**Histopathology of the Nasal Mucosa in Leprosy.**] *Rev. Brasileira Leprologia.* S. Paulo. 1944, Dec., v. 12, No. 4, 309–64, 18 figs. [Bibliography.] English summary.

The author has examined sections of tissue from the nasal septa, some taken by biopsy, 46 from the same number of patients from whom a specimen was taken from one side only, and 120 from 60 patients, specimens being taken from both sides—166 specimens from living subjects. Another 24 were taken post mortem. The tissues were fixed in 10 per cent. formalin and then embedded in paraffin or sections were prepared by the freezing method. Sections were cut at different levels and stained in several ways: haematoxylin and eosin, the orcein hydrochloride method for elastic fibres, and the Faraco technique for staining Hansen's bacilli. Frozen sections were stained by haematoxylin and Scharlach R. The author then describes in great detail the changes, but these are set forth more demonstrably in the excellent series of photo-micrographs than can be followed in the minutely descriptive text. He divides the lesions into two main groups: those *correlated* with the leprotic process (such as might occur with other chronic inflammatory conditions) keratosis, erosions, oedema, congestion and small haemorrhagic foci, sclerosis, hyalinization and so forth; secondly, those peculiar to leprosy such as periglandular lepromatous infiltration, perivascular (including perilymphatic) infiltration, the macrophage lepra cells of Virchow, bacillary invasion of the nerve filaments, with thickening of the sheath and degeneration of the fibrils.

He describes these as they appear in the follicular or sarcoid types of tuberculoid leprosy. In his comments he notes that some of these changes may be seen in patients who, clinically, appear to be normal, and, therefore, such examinations may be useful and important in early diagnosis of the disease and especially in contacts. [The photographs of the sections showing the tissue changes are excellently reproduced and the article is documented by a bibliography of over 400 references.] *H. Harold Scott.*

DE SOUZA, A. R. Sindromo de Claude Bernard-Horner na lepra. [**The Claude Bernard-Horner Syndrome in Leprosy.**] *Rev. Brasileira Leprologia.* S. Paulo. 1944, Dec., v. 12, No. 3, 379–82.

Three signs characterize the Claude Bernard-Horner syndrome: ptosis (or pseudoptosis), enophthalmia, and myosis; to these may be added. varied pigmentation of the iris (heterochromia) and lowered ocular tension. Under these conditions pinching of the skin of the neck fails to cause dilatation of the pupil, the eye symptoms are not affected by instillation of cocaine, but local application of atropine, by lowering the tone of the iris, results in disappearance of the myosis. The syndrome is due to sympathetic affection, but may be found in those of the medulla, the nerve roots or the ganglia.

The patient in whom this was observed and whose case is here recorded was a Spaniard, aged 56 years, from S. Paulo. The first sign of leprosy which he noticed was an anaesthesia of the left thumb, when he was 40 years old. Now, the signs are well developed—infiltration of the ears, cheeks, nose and supraciliary

ridges, maculae on arms and trunk, etc. Leprosy bacilli were found in the nasal mucus and the skin lesions, blood Wassermann and Kahn were 3-plus, spinal fluid negative.

In the discussion the author enumerates the causes of the syndrome, or the conditions in which it occurs, such as wounds of the sympathetic, compression by enlarged thyroid or lymphatic glands, lymphosarcoma, granuloma, abscess, vertebral lesions, aneurysm, carcinoma of oesophagus, pleural adhesions, syringomyelia, tabes. He states that in this case none of these was discoverable and " syphilis, tuberculosis and tumours were looked for without result " [but his serum gave a 3-plus to the Wassermann and Kahn tests] and he wonders whether leprosy itself may cause it. He has examined 800 lepers in the Santo Angelo leper colony, but found no other like the one he records.

H. Harold Scott.

ARGÜELLES CASALS, D. Lepra e hiperestesia ungueal. [**Leprosy and Onychalgia.**] *Rev. Sifilografía, Leprología y Dermatología.* Marianao, Cuba. 1945, Jan., v. 2, No. 1, 55–6.

Onychalgia, or ungual hyperaesthesia of Oppenheim, is a rare condition, reported apparently first by Oppenheim in 1903 and seen for the first time in Cuba by Argüelles Casals in 1942 (*Rev. Méd. Cubana*, 1942, v. 53, 1041). The nails *appear* to be quite normal but are exquisitely tender. [From the description, it would seem that the tips of the thumbs and fingers rather than the nail areas are the sites of pain.] Buttoning up the clothes, tying a shoe-lace, playing the piano, typing, wearing gloves, for example, are impossible. Cutting the nails is associated with most acute pain which persists after the operation. Oppenheim considers it to be a " neurosis " [which does not explain much] and says it occurs in members of " neurotic families " ; the treatment recommended is galvanism and psychotherapy.

The author records a case in a woman of 66 years who had suffered from the lepromatous form of leprosy for four years and for the last two months with this onychalgia in both hands. Buttoning the clothes, cutting the nails or even slight pressure on them is acutely painful and brings tears to her eyes. Though the toes were not affected when the author saw her she said that she had had the pain there earlier and that it had disappeared in the course of her treatment with chaulmoogra oil.

The author does not consider the question whether leprosy can produce this condition, but states definitely that they are quite distinct since Oppenheim's syndrome is not associated with peripheral neuritis, whereas the pain in leprosy is explicable by the neuritis. [This is, of course, a mere begging the question and does not rule out the possibility of leprosy being one cause of the syndrome.]

H. Harold Scott.

ROTBERG, A. Valor prognostico da lepromina-reação de Mitsuda. Observação de 455 casos durante 5–6 anos. [**Prognostic Value of Mitsuda's Lepromin Reaction.**] *Rev. Brasileira Leprologia.* S. Paulo. 1944, Dec., v. 12, No. 4, 367–77, 2 charts. English summary.

From among a large number of persons on whom the lepromin reaction had been carried out during 1936–37 the author has followed up 445 who were in good state physically, were bacterially negative and were undergoing out-patient treatment at dispensaries. This follow-up has continued for 5–6 years, to 1942. Of this total 323 have shown no clinical change and have remained bacterially negative, 86 have developed symptoms of the lepromatous type of evolution—fresh maculae, infiltrations, bacteria present. Twenty-seven have undergone tuberculoid development—annular lesions, sarcoid, but bacterially negative ;

nine are " not characteristic " ; they present fresh maculae and are bacterially negative and cannot be placed in either of the other two groups [see this *Bulletin*, 1934, v. 31, 12]. The accompanying Table gives the results of the lepromin reactions in these cases :—

Lepromin reaction	Reactivation			Unchanged	Total
	Lepromatous	Not characteristic	Tuberculoid		
—	54	6	2	29	91
+	32	3	5	61	101
++	0	0	13	93	106
+++	0	0	7	140	147
Totals ...	86	9	27	323	445

From this it will be seen that among 91 lepromin-negative cases there were, in percentages, 59·3 lepromatous, 6·6 non-characteristic, 2·2 tuberculoid ; 31·8 were unchanged ; among the 101 giving the one plus reaction the percentages are practically those written as totals ; of the 2-plus 12·2 per cent. were tuberculoid, while 87·8 were unchanged, and of the 3-plus 4·7 per cent. were of the tuberculoid type.

In a similar way the author has investigated 182 non-characteristic cases and Table II gives the results of these :—

Lepromin reaction	Reactivation			Unchanged	Total
	Lepromatous	Not characteristic	Tuberculoid		
—	10	5	2	4	21
+	11	1	2	30	44
++	0	0	7	52	59
+++	0	0	1	57	58
Totals ...	21	6	12	143	182

Detailed observations on these are not necessary, but it will be seen how marked is the tendency for negative or one-plus reactions to relapse with the lepromatous forms. The author concludes : " These results confirm the possibility of the prognostic utilization of the LT [lepromin test], which would permit the prophylactic services to concentrate on the follow-up of the negative and weak positive reactors, prone to frequent relapses of the contagious type."

H. Harold Scott.

HELMINTHIASIS.

VASILKOVA, Z. G. **[The Problem of the Purification of the Water of the River Moskva from the Eggs of Helminths.]** *Med. Parasit. & Parasitic. Dis.* Moscow. 1944, v. 13, No. 5, 11–16, 2 figs. [In Russian.]

The author investigated a part of the River Moskva, 34 kilometres long, which passes through a thickly populated industrial region. Samples were taken from

both banks and at different depths and also, during all seasons of 1940 and 1941, from the various waterways of a sewage works, whose main outlet discharges into the river. This outlet was the main source of contamination of the river water with helminth eggs, but they also came from household drains, industrial sewage and natural waterways entering the river. The samples were filtered and the filtrate was examined for eggs either wet or after drying and clearing of the eggs with clove or cedarwood oil. The viability of the eggs was tested in a moist chamber at 20–24°C.

In the water from the sewage works, 4,500 helminth eggs per cu. m. were found; the eggs were those of *Ascaris*, *Trichuris*, *Taenia* and *Diphyllobothrium* ("Broad ribbon"). In the Moskva River water there were, in addition to the eggs of these species, those of *Enterobius* and *Dicrocoelium*. In this river water the following percentages of eggs were found: *Ascaris* 86·6, *Trichuris* 4, *Enterobius* 0·4, *Taenia* 3, *Diphyllobothrium* 5·5, *Dicrocoelium* 0·4. [It is unfortunate that Russian helminthologists so often omit the generic and specific names. Much confusion would be avoided if the Latin names were given.]

Sampling at different depths on both banks of the River Moskva showed that some natural purification occurs by the settling of the eggs to the bottom of the river. The degree of this natural cleansing depends upon the speed of the current and the depth and volume of the water. The author calculates that there is a natural cleansing in this way to the degree of 69 per cent. in 32 km. during 103 hours. Thus at a village 2·5 km. above the entry of the main outlet of the sewage works, there were 29 eggs (of all species) per cu.m.; at a village 2·5 km. below this outlet, there were 263 eggs per cu.m.; 32 km. lower down, below an intervening dam, there were 91 eggs per cu.m. The eggs were most numerous in samples taken on the left bank, on which the sewage works are situated, but on the right bank the highest number was found at the dam, possibly because of incomplete mixture of the water. Of 49 samples taken 2·5 km. above the entry of the sewage works outlet, 15 (30 per cent.) contained eggs; of 154 samples taken below this outlet 71 (46·4 per cent.) contained them. The author treats his results statistically. Study of the eggs showed that 67·6 per cent. of the *Ascaris* eggs became embryonated in the normal time under laboratory conditions, while 11 per cent. were infertile and 23 per cent. were not viable. In the eggs of *Taenia* and *Enterobius* no externally visible change was seen, but the eggs of *Trichuris* and *Diphyllobothrium* were often deformed. The author thinks it is possible that the people may infect themselves from the river water by drinking it unboiled, by watering kitchen gardens with it and then eating uncooked vegetables, or by bathing. Better methods of purifying sewage water (such as the use of slag or sand filters after sedimentation, properly functioning filter beds and tanks without overloading) and helminthological examination of it are suggested. *G. Lapage.*

WASHINGTON. **A Symposium on Anthelmintics.** 334 pp. [Bibliography.] 1942. Published by the Proprietary Association of America, 810 Eighteenth Street, N.W., Washington, D.C.

This volume is a collection of extracts from the very extensive literature on anthelmintics and comprises selections from hundreds of papers. The anthelmintics dealt with are Aspidium, Carbon tetrachloride, Chenopodium, Pelletierine, Pepo, Santonin, Spigelia, Tetrachlorethylene and Thymol.

"The excerpts contained in these monographs reflect the medical and scientific opinion, experience and evidence of a substantial number of authorities. That there exist marked differences of opinion will be apparent. The single purpose of this undertaking has been to assemble recorded data without consideration of the nature of the opinions or the results of experiments."

It is evident that so great a collection of information and opinion, placed so easily and relatively compactly at the disposal of the reader, will be an invaluable aid to those studying the subject and to those who may have to make plans for the treatment of helminthic diseases, on a large scale, in the countries where these affections are prevalent. *Charles Wilcocks.*

PARANJAPE, K. D., PHALNIKAR, N. L., BHIDE, B. V. & NARGUND, K. S. *In vitro* **Observations on the Anthelmintic Action of some Synthetic Lactones and Compounds allied to Santonin.** *J. Indian Med. Ass.* 1945, Jan., v. 14, No. 4, 69–73. [17 refs.]

The authors set out to discover which of a series of lactones and compounds related to santonin which have been synthesized by NARGUND *et al.* (*Rasayanam*, 1943, v. 8, 233, and *J. Univ. Bombay*, 1940, v. 9, 145) are capable of being good anthelmintics. Some of the earlier literature is discussed. The authors refer to earlier workers who studied the *in vitro* action of drugs upon roundworms. They, however, found it difficult to obtain roundworms and difficult to keep them alive, and therefore decided to test their compounds upon three local "species" of the earthworm *Pheretima elongata* and upon small freshwater fish [the species is not stated, but young specimens 4 to 5 cm. long were used]. The authors discuss the validity of tests done on these animals. They record that CHOPRA and CHANDLER (*Anthelmintics and their use in medical and veterinary practice*, 1928) point out that earthworms and helminths belong to totally different zoological groups, so that experiments done on the former can only be rough guides at best. The authors accept, however, the recommendations of "the International Conference at Edinburgh and Geneva" (no ref.) and of the Hygiene Committee of the League of Nations, of the method of SOLLMANN (*J. Pharm. & Exper. Therap.*, 1918, v. 12, 129), who regards, the authors say, the action of anthelmintics upon earthworms as similar to their action upon helminths. The authors therefore used Sollmann's simple immersion method. Three earthworms of about the same size, and also the fish, were immersed in 100 cc. of solutions of the substances tested. The concentrations of these substances were 0·02, 0·015, 0·01 and 0·005 [per cent., presumably]. Controls were done with a 0·02 per cent. solution of santonin.

For the results the paper must be consulted. The structural chemical formulae of the compounds tested are given. The authors conclude that the simple dienones are likely to prove to be good anthelmintics and that some of the lactones tested are worth further trial.

[If further trial is made, the method of BALDWIN (this *Bulletin*, 1944, v. 41, 54) might be tried. This method uses *Ascaris lumbricoides* of the pig and gives kymographic records of the effects of the drugs. Baldwin also discusses the validity of experiments done upon earthworms, referring to the "strong criticism" made by LAMSON and WARD (*Science*, 1936, Sept. 25, 293) of the use of annelids. These authors found no correlation of the action of 121 chemical compounds on earthworms and pig *Ascaris*. Baldwin has no doubt that the neuromuscular mechanism of *Ascaris* differs fundamentally from that of earthworms. Since he found that santonin acts mainly upon the nerve ring in the anterior region of *Ascaris* and that the lactones, pilocarpine, strophanthine and umbelliferone had no effect upon *Ascaris*, this point would seem to be important. The method of LAMSON and BROWN (this *Bulletin*, 1936, v. 33, 577), which observes the effects of solutions of anthelmintic substances upon *Ascaris lumbricoides* immersed in them, is an additional alternative to the use, for experiments of this kind, of animals which are not helminths.]

G. Lapage.

STEPHENSON, R. W. **Treatment of Bilharziasis with Stilbamidine.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1945, Mar., v. 38, No. 4, 306–8.

Nine patients, heavily infested with *Schistosoma haematobium*, were treated with stilbamidine, 15 intravenous injections being given with doses similar to those used by KIRK and SATI [this *Bulletin*, 1941, v. 38, 260; 1–2 mgm. per kgm. were given daily or on alternate days] the usual total dosage being 2–2·2 gm. The results were judged solely by the effect on the eggs, a cure being presumed when they failed to hatch. In five cases there was no change, in two the number of eggs in the urine was much reduced but living eggs were still present, and two patients were apparently cured. In one of the cured cases no eggs were found in the urine during an observation period of one month after one course of 15 injections; in the second cured case, where infestation was very heavy, there were very few eggs in the urine at the end of a course of injections though some were living; a second course of 10 injections was given and after the third injection no living eggs were found over an observation period of two months.

The author concludes that the action of stilbamidine is too uncertain to justify its routine use in urinary schistosomiasis. *J. F. Corson.*

BERCOVITZ, Z. T., SHWACHMAN, H. & RODRIGUEZ-MOLINA, R. **The Blood Picture in Asymptomatic *Schistosoma mansoni* and other Intestinal Parasitic Infections.** *Amer. J. Trop. Med.* 1945, Jan., v. 25, No. 1, 41–5, 1 chart.

In a previous paper, BERCOVITZ and others [this *Bulletin*, 1945, v. 42, 47] reported changes in the rectal mucosa in 155 Army recruits of Porto Rico who were infested with *Schistosoma mansoni*, but had no symptoms of the disease. In the present paper the results of examination of the blood of 147 of those recruits are given; most of them (130) were also infested with various intestinal worms.

The blood examination consisted of total and differential counts of the corpuscles and estimation of the haemoglobin. In some of the men there was a slight increase above normal in the eosinophile leucocyte count and some showed slight leucocytosis, but otherwise the blood findings closely resembled those of a control group of 450 healthy males of Porto Rico. *J. F. Corson.*

MEIRA, J. A. & RAMOS, J., Jr. Considerações sôbre o electro-cardigrama na esquistosomiase mansoni. Contribuição para o estudo da miocardite esquistosomótica. Concomitância de forma cardíaca de moléstia de Chagas com esquistosomiase mansoni avançada no mesmo doente. [**The Electrocardiogram in *Schistosoma mansoni* Infestation.**] Reprinted from *Hospital*. S. Paulo. 1944, Nov., 717–46, 8 figs. [29 refs.] English summary.

The authors studied the electrocardiogram in 20 patients who were infested with *Schistosoma mansoni*, but they obtained no results to indicate the presence of myocarditis; the study was complicated by the presence of other pathological conditions in at least some of the patients. From a review of the subject, however, they concluded that two kinds of myocarditis may occur in schistosomiasis due to *S. mansoni*: one, very rare, is characterized by the presence of schistosomal granuloma in the myocardium, while the other, commoner but not yet well known, is confused with Fiedler's myocarditis, but should be distinguished from it. *J. F. Corson.*

CASTRO G., J. Hidatidosis ósea. [**Hydatid Disease of Bone.**] *Rev. Med. de Chile.* 1944, Dec., v. 72, No. 12, 1074–7, 1 fig.

The author records two cases of hydatid disease of the tibia in his own practice and adds comments on the condition, based largely on a monograph on the subject by Professor Oscar IVANISEVICH of Buenos Aires. The histories are in many respects similar in the two cases; diagnosis is usually delayed and at first erroneous; hence it may be well to present them fairly fully.

The first patient was a man of 25 years who, 15 years before, had been operated upon for hydatid of the liver. This seems to have been entirely overlooked when he was admitted in 1935 with a fracture of the right leg at the junction of the upper and middle thirds of the tibia. It was put up in plaster of Paris, but after 60 days there was no union and the plaster was re-applied for 80 days. Still there was no consolidation, but a pseudarthrosis. In view of a doubtfully positive Kahn reaction he was given antisyphilitic treatment, without benefit. Radiograms then showed several clear areas in the bone, varying in size, without periosteal reaction of local sclerosis. Operation was performed and several hydatids removed. The tibia was reduced to a mere shell. He left hospital with a plaster splint and did not return; all that is known of his subsequent history is that he died of pneumonia about a year later.

The second patient was a professor, 48 years of age, who came to the hospital in June 1944. Four years before, when walking, he fell and broke his left leg at the junction of the upper and middle thirds of the tibia. A plaster splint was applied. This was removed after 45 days and he was told to rest the limb and have it massaged. He suffered more or less continuously afterwards from pain and could only get along with crutches. He again went to hospital; mal-union was diagnosed and operation was undertaken to rectify it. A pseudarthrosis was found and grafts inserted. Progress was slow; the wound suppurated and ten weeks later another operation was decided upon. This time several hydatids were removed. Progress was not satisfactory and destruction of bone so extensive that amputation was advised and performed at the lower third of the thigh, after which all went well.

The author quotes Ivanisevich's monograph to the effect that hydatid of bone is always multiple or multilocular, that fractures resulting from their presence may unite, but union does not modify the progress of the disease, evolution is slow (5–10 years), diagnosis rarely correct beyond the vague "cystic disease of bone"; of 464 cases of hydatid operated upon by himself, in 2 per cent. there was bone localization; prognosis is grave, most of those cases in which a limb is involved require amputation in the end, while spine hydatids are always fatal. *H. Harold Scott.*

PODYAPOLSKAYA, V. P. & ISAICHEVA, A. I. [**Treatment of Hymenolepidosis with Male Fern in combination with other Preparations.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1944, v. 13, No. 5, 3–6. [In Russian.]

The authors gave ethereal extract of male fern by the method described by PODYAPOLSKAYA and VASILKOVA (*Med. Parasit. & Parasitic Dis.*, 1934, v. 3, 257) and by other Russian authors. The full dose of male fern is given in three parts on three occasions, called cycles, with intervals of 10–12 days between them. On the first occasion the treatment lasts two days, while the second and third last one day each. In the present series a purgative was given on the evening before the male fern and another followed the male fern. By this method, using male fern alone, PODYAPOLSKAYA and VASILKOVA (*loc. cit.* above) obtained 21·7 per cent. of complete and constant cures. GOLUBYATNIKOV (*Soviet Medicine*, 1942, v. 6, 26) used two variants of this method and obtained

28·1 and 21 per cent. of cures. Using a modification of this method IONINA [this *Bulletin*, 1944, v. 41, 499] obtained 24·1 per cent. of cures. GORYACHEVA [below] obtained 56·2 per cent. of cures [see also KEVORKOV, this *Bulletin*, 1944, v. 41, 498] and GORODILYOVA (*Med. Parasit. & Parasitic Dis.*, 1943, v. 12, 72), quoted in the paper here under review, obtained only 8 per cent. of cures by this method. In the series here described Podyapolskaya and Isaicheva obtained only 2·8 per cent. of complete cures in 106 children ; they ascribe this poor result to the effects of difficult wartime conditions which caused malnutrition and crowding which favoured reinfestation.

Dissatisfied with the general results of this method of giving male fern, although it is better than giving it in single doses, Podyapolskaya and Isaicheva tried supplementing the male fern with either acrichine [also called acriquin and similar to atebrin (mepacrine)], or methylene blue or yatren. Acrichin and methylene blue stain tissues and it was thought that they might be toxic to the cestodes and their cysticercoids. Yatren contains 26–28 per cent. of iodine and thus might also be toxic to the cestodes ; further, its slight laxative action would tend to prevent retention of the cestodes in the gut mucus after the male fern had detached them.

The experiments were done with children in Samarkand. Out of 1,826 children aged 3–14 years, 479 (26·2 per cent.) were infested. Infestation in different groups varied between 7·7 and 54 per cent. Faecal examinations were done by the method of Fülleborn. Children were adjudged cured when not less than five faecal examinations during two months failed to reveal eggs.

Acrichine, methylene blue and yatren were given once daily by the mouth in the doses shown in Table 2 during the days before or after those on which male fern was given ; acrichine was given on 3 or 5 successive days at the first of the three cycles or on 3 days at the second and third cycles ; methylene blue was given on 3 successive days at all three cycles or only at the second and third and sometimes after the third cycle as well ; and yatren on 4 successive days at all three cycles or only at the second and third cycles and sometimes after the third as well. The results are shown in Table 3.

Both yatren and methylene blue gave better results than acrichine. Yatren gave strikingly better results when it was given after male fern (28·3 per cent. of cures in 46 children) than when it was given before male fern (6·5 per cent. of cures in 31 children).

TABLE 2.

24-hour doses of preparations in grammes according to age, in years.

Age, years ...	3	4	5	6	7	8	12	13	14
Male Fern ...	0·3	0·6	0·9	0·9	1·2	1·2	1·8	2·1	2·1
Acrichine ...	0·075	0·1	0·125	0·125	0·15	0·175	—	—	0·225
Methylene Blue	0·03	0·04	0·05	0·06	0·07	—	—	—	—
Yatren	0·15	0·2	0·25	0·3	0·35	0·4	0·6	0·7	—
Number of children treated			305			2	1	2	3
								8	
			313						

TABLE 3.

Efficiency of the different methods of treatment.

Supplementary preparation	No. treated	Cured		Not cured		Doubtful		Reinfected	
		No.	%	No.	%	No.	%	No.	%
Controls (male fern only) ...	106	3	2·8	97	91·5	6	5·7	2	1·9
Acrichine ...	59	9	15·3	50	84·7	—	—	2	3·4
Yatren (before male fern) ...	31	2	6·5	28	90·3	1	3·2	2	6·5
Yatren (after male fern) ...	46	13	28·3	27	58·7	6	13·0	1	2·2
Methylene Blue (before each male fern cycle regularly)	38	16	42·1	19	50·0	3	7·9	2	5·3
Methylene Blue (irregularly and before the second cycle)	33	9	27·3	22	66·7	2	6·1	—	—
Methylene Blue Total cases ...	71	25	35·2	41	57·7	5	7·0	2	2·8
Grand Total ...	313	52	16·6	243	77·6	18	5·8	9	2·9

The best results were obtained with methylene blue. Given regularly before each cycle of male fern methylene blue gave 42·1 per cent. of cures in 38 children; given irregularly before the second cycle of male fern it gave 27·3 per cent. of cures in 33 children.

The authors conclude that the best treatment in the present state of knowledge is to give either methylene blue before each cycle of male fern or yatren after each cycle. Combinations of all three of these supplementary compounds should be tried. Under peacetime conditions the percentage of cures obtainable will probably be higher. *G. Lapage.*

GORIACHEVA, L. K. [**Comparison of the Efficiency of the Treatment of Hymenolepidosis by Different Methods.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1944, v. 13, No. 5, 7–10. [11 refs.] [In Russian.]

After summarizing some of the literature on this subject the author concludes that there is not sufficient statistical material about the efficacy of treatment with pumpkin seeds; that, although single doses of male fern evacuate large numbers of *Hymenolepis*, their effect is only transient; and that the method of PODYAPOLSKAYA and VASILKOVA [above] gives a striking percentage of complete cures.

The author experimented with pumpkin seeds and with male fern given either in single doses or by the method of Podyapolskaya and Vasilkova.

1. Pumpkin seeds (*Cucurbita pipa*).—After removal of the outer skin of the seeds, they were chopped up and 150–300 of them were given in food on an empty stomach with a saline purge 1 to 1½ hours later. The treatment was repeated after 10 days. The seeds were given to 23 children aged 6 to 12 years. The number of worms expelled was insignificant and no worms were expelled by five subjects. The eggs reappeared in the faeces of 21 out of the 23 children within two weeks to three months. Absence of eggs from the faeces for eight months indicated cure in the other two.

2. Full doses of male fern given by the method of N. P. KEVORKOV (*Med. Opinion*, Uzbekistan, 1930, Feb., No. 5, p. 43).—The patient was prepared by diet and laxatives on the eve of taking the male fern the next morning on an empty stomach. Half an hour before taking the male fern, the patient drank 1 per cent. solution of sodium bicarbonate, and had a saline purge 1 to 1½ hours after the male fern. In all, 76 patients, some of whom were children, were treated by this method. Parasites were expelled usually in great numbers (1,000 to 3,000 specimens with scolices) and subjective symptoms disappeared as the eggs disappeared from the faeces. The effect was, however, transient, eggs being found in the faeces of 54 patients from two weeks to five months after treatment, with reappearance of the symptoms. The patients who were regarded as cured were observed for two years, during which time no eggs appeared in their faeces, nor did symptoms reappear; but repeated doses were necessary to effect a cure. These poor results suggested the trial of other methods.

3. The method of PODYAPOLSKAYA and VASILKOVA (see above).—Patients were prepared in the same way as under 2, but one-third of the total dose of male fern was given on three occasions with intervals of 10 days between these fractional doses. Children were given 0·5 gm. per year of age and adults 6–8 gm. In all, 78 patients were treated. Experience shows that small doses of male fern given in this way remove striking numbers of cestodes (500 to 1,300 with scolices per day) and that the maximal number are expelled on the first day. Examinations were done of 32 patients for 6 months to 1½ years, and of 14 patients for 6 months. In the course of 1½ years of such examinations, 18 showed no eggs in their faeces (56·2 per cent.) and these were regarded as cured; their symptoms also disappeared. These results confirm other reports in the literature of the efficacy of this method, and the author regards it as the best method at present available. *G. Lapage.*

WHITEHILL, R. & MILLER, M. H. **Infestation of the Genito-Urinary Tract by *Strongyloides stercoralis*: a Case Report.** *Bull. Johns Hopkins Hosp.* 1944, Sept., v. 75, No. 3, 169–74.

The authors record the occurrence of the larvae of *Strongyloides stercoralis* in human urine and refer to a previous report of a case by FORNARA [this *Bulletin*, 1923, v. 20, 229]. The patient was an unmarried white sailor, aged 22, who was admitted to hospital in the South Pacific because of frequency of micturition, nocturia and urgency. Five days before admission, larvae of *S. stercoralis* were found in the sediment of his centrifuged urine. The night before admission he had abdominal cramps and diarrhoea. The abdomen was normal except for slight tenderness of each lower quadrant of the colon. For three years the patient had had lower abdominal discomfort after eating, which was relieved by passage of flatus. He had been in the Navy for 18 months and had been stationed in Michigan, New Caledonia, Idaho, the New Hebrides and Fiji and had been in the South Pacific for ten months before admission to hospital. There was a history of diurnal frequency up to 10 times for as long as the patient

could remember, with some urgency especially in the early morning, and nocturnal enuresis until the age of 16 and then nocturia twice every night. The patient denied sodomy and pederasty. Apart from prickly heat and fungal infections of the feet and genito-crural regions there were no important physical signs.

There were no eosinophils recorded in the differential white cell count.

Urinary sediment examined daily showed larvae of *S. stercoralis* on four occasions during the first ten days. Five cc. of this urinary sediment were added to an equal quantity of the patient's stool, which had previously been found, by floatation with zinc sulphate, to be free from *Strongyloides* or its eggs. The mixture was then kept at 25–30°C. for 48 hours. Numerous larvae and a few gravid females and adult males of *S. stercoralis* were then found in the mixture, the finding being confirmed by the parasitologist of a large British Colonial hospital. Numerous stools contained eggs of *Trichuris trichiura*, but none of *S. stercoralis*.

A complete urological examination revealed only a small, slightly trabeculated area on the posterior wall of the bladder and a few small areas of injection of its mucosa, with slight injection of the trigone ; the vesical orifice was slightly irregular, with a small polyp-like projection at 2 o'clock ; there was reduced bladder capacity, with high pressure.

The authors think there is sufficient evidence for the conclusion that there was an infection of the genito-urinary tract with *S. stercoralis*. Care was taken to avoid contamination of the urine from the stools. No larvae were found in catheter specimens of urine, but their appearance in voided urine was inconstant and the larvae were found in the urine on five separate occasions. The symptoms disappeared with the disappearance of *Strongyloides* after treatment. The origin of the infection was not discovered. The authors refer to reports by various authors of the penetration by the filariform larvae of the bowel wall or perianal skin and their entry into the liver, mesenteric venules, lymphatics and lymph nodes [see this *Bulletin*, 1930, v. 27, 979 ; 1937, v. 34, 30 ; 1939, v. 36, 844 ; 1941, v. 38, 118]. The patient was treated with 0·06 gm. gentian violet, given for 14 days in enteric-coated capsules by the mouth after each meal. After a week of this treatment the nocturia, urgency and incontinence disappeared and diurnal frequency was reduced to six times. *Strongyloides* also disappeared from urine examined daily ; urinary sediment was negative and mixtures of urine and stools showed neither *Strongyloides* nor its eggs after 48 hours.

The *Trichuris* was treated while the gentian violet was being given with 0·9 gm. hexylresorcinol by the mouth on two occasions with intervals of 12 days. Three days before the last dose, eggs of *Trichuris* were present in the faeces.

The patient was discharged on the last day of treatment with gentian violet, free of symptoms. A week later, urine and stools were negative as were also cultures of mixed urine and stool. Urological examination then showed no important abnormality and the polypoid projection at the urethral orifice had disappeared. The urine and stools were again negative 3 and 15 days later.

G. Lapage.

ROGERS, W. P. **Studies on the Nature and Properties of the Perienteric Fluid of** *Ascaris lumbricoides*. *Parasitology*. 1945, Mar., v. 36, No. 3/4, 211–18, 13 figs. [59 refs.]

COGGESHALL, L. T. **The Problems of Filariasis.** *Southern Med. J.* 1945, Mar., v. 38, No. 3, 186–8.

MILLER, J. F. & EINHORN, N. H. **Oxyuriasis : a Clinical Survey of 200 Consecutive Cases of Infection with *Enterobius vermicularis* in Children.** *Amer. J. Dis. Children.* 1944, Dec., v. 68, No. 6, 376–81.

The authors studied 200 children in the Gorgas Hospital, Ancon, Canal Zone. Group 1 consisted of 55 boys and 45 girls, all hospital patients. There was, in this group " no particular pattern of age distribution " of enterobiasis, although the incidence was low in subjects under two years ; 71 per cent. were whites, 20 per cent. mestizos [this term was used to include mixed white and other blood] and 9 per cent. negroes. Living conditions were as follows : 81 per cent. lived in the Canal Zone, where crowding was minimal, sewage disposal excellent and toilet and washing facilities adequate ; most of the whites were in this category ; 14 per cent. lived in the City of Panama, where overcrowding was great, sewage disposal fair and washing facilities inadequate ; 5 per cent. lived in the interior of Panama Republic, where there was no crowding, but living conditions were primitive. Most of the mestizos and negroes were in the latter two categories.

Group 2 consisted of 45 boys and 55 girls, from the out-patient department. Of these, 90 per cent. were whites, 10 per cent. mestizos. They showed a high incidence of enterobiasis between the ages of 2 to 5 years, possibly because there was closer observation by the mothers of the children of these ages. In this group 84 per cent. lived in the Canal Zone, 13 per cent. in the City of Panama and 3 per cent. in the interior. The authors expected that the mestizos and negroes, because of their low standards of life, would show a high incidence ; they compare their failure to find this with the much higher incidence in whites recorded by CRAM [this *Bulletin*, 1943, v. 40, 618].

The symptoms are discussed in some detail. The authors propose to classify them into local ones, symptoms secondary to these, nervous and gastro-intestinal symptoms, and eosinophilia. The haemoglobin and red and white cells showed no significant difference from those of controls, except that there was a slight eosinophilia in some subjects ; but it was too inconstant to be of value for diagnosis. The authors think that the NIH cellophane swab which they used is better than examination of the faeces, which has little value. Careful observation by the mother or nurse, especially at night, may diagnose when NIH swabs fail. Thus in 13 per cent. of subjects in Group 1 and in 59 per cent. in Group 2, worms were seen on the perianal region. NIH swabs diagnosed 95 per cent. of subjects in Group 1 and 53 per cent. in Group 2. Faecal examinations diagnosed only 1 per cent. in Group 1 and none of those (20) thus examined in Group 2.

Treatment was by gentian violet, quassia enemas and tetrachlorethylene. Inadequate subsequent care made evaluation of the effects of treatment difficult. Tetrachlorethylene was given in one dose ; it was of no value. *Quassia enemas.* Rectal injections of 2 to 3 ounces (60 to 90 cc.) of strong infusion of quassia chips were given and 20 minutes later a soap enema. This was repeated on alternate days for two months. The treatment was given by the parents at home, and treatment was regarded as valuable, especially for younger children who cannot swallow gentian violet capsules, but it did not always cure. *Gentian violet,* also given at home, was the best treatment, but could only be given to children old enough to swallow the enteric-coated capsules in which it was given. The dose was 0·25 grain (0·015 gm.) to 1 grain (0·06 gm.) three times daily, 20 minutes before each meal, for two periods of eight days, each with an interval of seven days between. Gentian violet sometimes caused vomiting. Successful treatment was adjudged by absence of visible perianal worms, cessation of symptoms and repeatedly negative NIH swabs. The authors point out that there is no absolutely reliable method of ruling out enterobiasis. Some

subjects showed 5 or 6 negative NIH swabs and then a positive one [*cf.* CRAM, *loc. cit.* above, who records that as many as seven successive negative swabs may be necessary]. *G. Lapage.*

HELLER, E. R. [**The Epidemiology of Enterobiasis.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1944, v. 13, No. 5, 16–23, 1 fig. [19 refs.] [In Russian.]

The author studied the effects of temperature, humidity and drying on the development of eggs of *Enterobius vermicularis* in a moist chamber, the structure of which is described. For the details of the results obtained the paper itself must be consulted. The earlier work summarized shows that only a small percentage of the eggs found in dust retain their viability. Thus NOLAN and REARDON [this *Bulletin*, 1939, v. 36, 845] found that 90 per cent. of the eggs in 91·7 per cent. of 241 samples of dust were dead or not viable. The author's observations on the effects of temperature showed that the optimal temperature for the development of the eggs is 34–36°C., at which temperature they reach the infective stage in 4–6 hours. The human perianal region is very favourable to their development and eggs fixed here in silken bags reached the infective stage in 4–5 hours. At 38°C. development to the infective stage required 4–5 hours, but there was heavy mortality among the eggs. At 40°C. development did not reach the infective stage and there were many abnormalities among the embryos. At 41–42°C. the eggs died without development. Outside the host the eggs developed to the " tadpole " stage at temperatures between 22 and 40°C. At 22°C. the infective stage was not reached and the eggs usually died in 12–15 hours. The rate of development increased with the rise in temperature. Eggs were very sensitive to low temperatures and at —15°C. they died in 40–50 minutes.

After summarizing the earlier work on the effect of moisture and drying, the author gives his own results. The viability of the eggs was tested by staining them with 1 per cent. methylene blue, which stains only the dead eggs. He found that the eggs are very sensitive to drying, but this sensitivity depends upon the stage of development of the shell and upon the stage of development of the embryo. While it is still in the female worm the embryo reaches the " tadpole " stage and has an immature shell ; the shell is not completed until after the egg is laid. The development of a cuticular covering by the embryo also increases its resistance to drying. For these reasons eggs laid on and recovered from the perianal region of man are more resistant than those taken from the female worms. Thus the shells of eggs from the perianal region became wrinkled at 20 per cent. humidity, and about 5 per cent. of them reached the infective stage, although the embryos in them were dead after 10–12 hours. At 30 per cent. humidity they reached the infective stage. On the other hand, eggs taken at the " tadpole " stage from the female worms reached the infective stage only at a humidity of 70 per cent. and these had a poor degree of viability. Experiments on drying showed that, on the whole, the optimum humidity was 90–100 per cent., at which humidity all the eggs obtained from the perianal region kept their viability at room temperature (16–18°C.) for 96 hours. Thus sufficient ventilation and drying of rooms, etc., will kill most of the eggs and reduce the incidence of infestation. *G. Lapage.*

MATOFF, K. Altersimmunität und parenteral erzeugte Muskeltrichinellose beim Hunde. [**Age Immunity and Parenterally Produced Muscle Trichiniasis of the Dog.**] *Zent. f. Bakt.* I. Abt. Orig. 1943, Sept. 8, v. 150, No. 6, 328–36. [14 refs.]

Small dogs and small breeds of dogs were used, because their muscles are smaller, so that examination by trichinoscopy from four weeks onwards after

infection was facilitated. Either larvae or gravid females from the intestine were injected directly into the dogs' muscles or gravid females were injected intravenously or intraperitoneally. This parenteral method of infection was introduced by DOERR and other workers [see DOERR and SCHMIDT, this *Bulletin*, 1931, v. 28, 208]. These earlier workers used larvae expressed from fresh muscle or from gravid females. BERGER and STÄHELIN (*Zent. f. Bakt.*, I. Abt. Orig., 1929, v. 111, 144) injected gravid females into one masseter of guineapigs and obtained infection of the masseter of the other side. Matoff used for the experiments here described larvae born from females kept in normal saline or washed out of the peritoneal, pericardial and pleural cavities of rats and guineapigs given massive infections. After washing by centrifugation, these larvae were concentrated into ½ to 1 cc. of normal saline and injected with a small Record syringe directly into the masseter (usually the left) of the dogs. Gravid females were collected from the small intestines of infected rats and guineapigs by scraping the mucosa with the back of scalpel; they were then washed in saline and injected in ½ to 1 cc. of saline. Intravenous injections of 15 to 40 females were given to five dogs aged from 2 to 5 years; intraperitoneal injections of 20 to 50 females were given to five dogs aged 1½ to 3 years; intramuscular injections (into the masseter, usually the left) of 150 or 500 larvae, or 20 to 50 females, were given to eight dogs aged 1½ to 15 years. The dogs were examined 21 to 144 days after infection. Tables give details of the larvae found in the diaphragm, tongue, masseter and intercostal muscles of the dogs.

All the dogs showed infection of the muscles. Parenteral infection usually produces a higher degree of muscle infection in adult dogs than peroral infection does. The larvae showed no signs of degeneration or death. The age immunity does not therefore extend to the infection of the muscles by the larvae. In other words, the muscles do not offer resistance to the larvae as the alimentary canal (gastric juice) does. Very few larvae injected into the masseters developed. Thus when 200 larvae were injected into the masseter of a dog aged 1½ years only 12 larvae were found there by trichinoscopy 30 days later. In other instances, when 500 were injected into the masseter only 2 were found there 144 days later, and when 150 were injected only 1 was found 44 days later. But when gravid females were injected there was a much denser muscle infection, because larvae born naturally or by pressure during the injection are more viable than those washed out of body cavities and possibly others become viable in the mother before she dies. This applies also to intravenous and intraperitoneal injection of gravid females. *G. Lapage.*

DEFICIENCY DISEASES.

CAYER, D., RUFFIN, J. M. & PERLZWEIG, W. A. **The Clinical Significance of Glossitis and Cheilosis in Deficiencies of the B-Complex.** *Southern Med. J.* 1945, Feb., v. 38, No. 2, 111–17, 2 figs. & 6 charts. [11 refs.]

"By applying these laboratory methods [blood levels and saturation tests] to patients having glossitis or cheilosis, one should be able to measure the levels or degrees of saturation of the various vitamins, and thus determine the factor or factors responsible for the clinical picture under consideration." Values were determined for vitamins A, C, B_1, B_2 nicotinic acid and pyridoxine in (*a*) 28 patients showing definite clinical evidence of a deficiency of the B-complex, (*b*) "30 ward patients having neither glossitis nor cheilosis", (*c*) 30 medical students. Values for vitamin A were practically the same in the groups with and without glossitis and cheilosis.

In regard to vitamin C, a comparison of the arithmetical means of vitamin levels of the various groups showed no appreciable differences. Although five patients and four students had no measureable C in the blood plasma yet no clinical scurvy was encountered.

No correlation was found between the presence of glossitis and cheilosis and either thiamin or pyridoxine excretion.

" Although well below the mean for the student controls, still no significant differences were found in the riboflavin excretion of the groups of patients with and without glossitis and cheilosis."

On the other hand patients having either of these signs had excretion levels significantly lower than those of the control patients.

The authors, however, emphasize the fact that " a patient may have glossitis with a normal nicotinic acid excretion level and conversely a low nicotinic acid level does not predicate a sore tongue " ; a multiple deficiency may be implicated.

The authors believe that a nicotinic acid deficiency is a far more frequent cause of cheilosis than a deficiency of riboflavin. [They do not state, however, whether in their opinion the glossitis and cheilosis of nicotinic acid deficiency differ clinically from the conditions met with in riboflavin deficiency as is believed by other observers.] *H. S. Stannus.*

Stryker, G. V. & Halbeisen, W. A., with the technical assistance of Lucille Leventhal. **Determination of Macrocytic Anemia as an Aid in Diagnosis of certain Deficiency Dermatoses.** *Arch. Dermat. & Syph.* 1945, Feb., v. 51, No. 2, 116–23, 2 figs. [Numerous refs.]

Haematological examinations were carried out in a number of patients, exhibiting a variety of undetermined dermatological signs, suspected to be suffering from a vitamin B complex deficiency.

The skin lesions are described as an imperfectly symmetrical patchy or diffuse superficial pruritic, scaly, dry or vesicular erythroderma, which may be evanescent or, later, confluent, distributed over the sides of the neck, face, front of shoulders and upper part of the chest and axillary folds, sometimes also over the extremities. Eleven case reports are given.

The condition resembles contact dermatitis but is differentiated from it by the presence of a macrocytic anaemia, the history of dietetic deficiency and by the fact that the dermatosis and anaemia clear up under treatment with a crude liver extract.

It is pointed out that the eruption may occur in winter time and in indoor workers but nothing is said about the work.

This condition, seen in St. Louis, appears to resemble that described by P. Gross, *Arch. Dermat. & Syph.*, 1941, v. 43, 504. *H. S. Stannus.*

Medlicott, R. W. **Nicotinic Acid in the Treatment of some Psychiatric Syndromes.** *New Zealand Med. J.* 1945, Feb., v. 44, No. 239, 28–33.

During the last five years medical men in many countries have slowly come to recognize that a variety of mental states may be associated with a nicotinic acid deficiency. In the majority of cases perhaps, the suspicion has been aroused by a history of deficient dietary or of some episode likely to upset metabolism, and the diagnosis has been confirmed by the response to the exhibition of nicotinic acid.

Dr. Medlicott reports six cases admitted to a mental hospital in New Zealand which serve very well to demonstrate some of the features to be met with in such cases. *H. S. Stannus.*

ALLISON, J. R. **The Relation of Hydrochloric Acid and Vitamin B Complex Deficiency in certain Skin Diseases.** *Southern Med. J.* 1945, Apr., v. 38, No. 4, 235–40, 8 figs.

Four hundred cases exhibiting a variety of skin conditions thought to be associated with a vitamin B complex deficiency were investigated in regard to gastric hydrochloric acid.

The group was drawn from poorer classes taking a diet of white bread, white grits, polished rice, fat meat and a few vegetables.

All showed some deficiency in acid secretion and all improved on being given hydrochloric acid by mouth together with high vitamin diet, yeast and liver. The author believes that treatment with addition of hydrochloric acid is better than by vitamin B complex alone. *H. S. Stannus.*

HAEMATOLOGY.

TOMLINSON, W. J. **The Incidence of Sicklemia and Sickle Cell Anemia in 3,000 Canal Zone Examinations upon Natives of Central America.** *Amer. J. Med. Sci.* 1945, Feb., v. 209, No. 2, 181–6. [16 refs.]

There have been no previous reports of sickle cell anaemia or sicklaemia from the Canal Zone or the Republic of Panama. This paper records the incidence of these conditions in the natives of this region based on routine consecutive studies of autopsy cases and hospital admissions, and on field studies in villages.

The phenomenon of sickling was elicited by the usual technique of examining sealed wet blood films after 24 and 48 hours. In a total of 3,000 examinations sickled cells were observed in 246 (8·2 per cent.). Analysis of sex distribution showed that sickling was present in 7·2 per cent. of males and 11·35 per cent. of females.

In the routine examinations made on autopsy cases and on patients admitted to hospital for various reasons, of a total of 2,372, sickling was present in 210 cases and in these evidence of sickle cell anaemia was found in 21, representing 10 per cent., or 0·9 per cent. of the group as a whole.

Analysis of the age groups of the autopsy cases indicates that sickling is relatively more frequent below the age of 40. *L. J. Davis.*

TOMLINSON, W. J. & JACOB, J. E. **Studies of Sickle-Cell Formation in Normal Saline, Plasma, and Sera with Carbonic Anhydrase Inhibitors.** *J. Lab. & Clin. Med.* 1945, Feb., v. 30, No. 2, 107–11.

"1. Erythrocytes capable of assuming sickled shapes will do so when resuspended in normal saline, their original plasma or serum, or in other compatible plasma or serum, providing they have not been washed more than five times in normal saline.

"2. Multiple washings of the erythrocytes remove some substance, possibly carbonic anhydrase, which is necessary for the phenomenon of sickling.

"3. Zinc acetate or sodium cyanide in concentrations of 1 : 1,000, when added to oxygenated blood, prohibits sickle-cell formation.

"4. Zinc acetate or sodium cyanide in concentrations of 1 : 1,000, when added to carbonated blood, does not reverse the sickled forms and they do not resume discoid shapes when exposed to air or oxygen."

Scherer, J. H. & Cecil, R. C. **Congenital Hemolytic Anemia in a Negro.** *J. Lab. & Clin. Med.* 1945, Mar., v. 30, No. 3, 244–6.

"The first case of congenital hemolytic anemia to be reported in detail in the Negro race is recorded. Apparently the disease, though rare, does occur among Negroes. The probability of transmission of the trait through miscegenation is discussed."

VENOMS AND ANTIVENENES.

Ridley, H. **Snake Venom Ophthalmia.** *Brit. J. Ophthalm.* 1944, Nov., v. 28, No. 11, 568–72. [18 refs.]

Several of the African colubrines are "spitting snakes," mostly species of *Naja*, but the commonest is *Naja nigricollis*, the black-necked cobra (sometimes, though wrongly, called the Black Mamba). This is up to 6 ft. in length. When cornered or attacked it slightly opens its jaws and "with a sharp hiss two jets of venom shoot forwards for about two feet and afterwards break up into a spray." This may be repeated and the range of action may be 8 and even 12 feet. Injury to the eye is localized and absorption of venom is slight, if any. Recovery is usually complete unless secondary infection results in corneal opacities.

The author records a case in a labourer, aged 30 years, who received a charge of the venom in his right eye at a distance of 4–5 feet. Pain was considerable, the conjunctiva was injected and the corneal surface oedematous and sensation absent. The eye was irrigated with saline and atropine was instilled. Next day, chemosis was marked and the lids oedematous; the lower half of the cornea was denuded of epithelium and sensation still absent. By the fifth day sensation was returning and fresh, but oedematous epithelium covered the cornea. This was detached and a fresh layer formed; by the 14th day the surface was normal except for a faint localized opacity, and vision was 6/6. This opacity persisted for at least two months. The corneal anaesthesia continued for the first week but there was never any sign of absorption or the usual neurotoxic symptoms associated with colubrine poisoning.

The rest of the paper deals with the usual properties of cobra venom and its uses as an analgesic in tabes, neuralgias, cancer, etc., and the effects of Daboia venom as a styptic, with which readers of this *Bulletin* are familiar. [See this *Bulletin*, 1936, v. 33, 391–96, 399; 1937, v. 34, 645, 660–63; 1938, v. 35, 520, 523, 891; 1939, v. 36, 567, 695; 1940, v. 37, 464, 515; 1941, v. 38, 660, 661.] *H. Harold Scott.*

Mohammed, A. H. **Notes on the Toxins of Egyptian Scorpions.** *Biochem. J.* 1944, v. 38, No. 4, 284–5.

The author prepared purified toxins of four species of Egyptian scorpions in the following way: The telsons, after being separated and dried over calcium chloride, were ground with quartz sand and small quantities of decinormal HCl; final extraction was made with this strength of acid and the extracts decanted. The extracts were neutralized with normal caustic soda and after addition of a solution of picric acid the liquid was allowed to stand for 24 hours. The precipitate which formed contained the toxin and was extracted with 80 per cent. acetone until all the soluble picrate was removed. Next, the toxin was precipitated as hydrochloride, centrifuged off, washed with dry acetone and ether and kept *in vacuo* over P_2O_5. The m.l.d. for the rat was 25–50 μgm./100 gm. body weight.

The toxin gave positive Millon and biuret reactions, was precipitated by saturated ammonium sulphate, by absolute ethanol and by acetone. It precipitated with picric acid, the precipitate disappearing on being heated and reappearing on cooling. The toxins were stable, at least for six days, when kept at 0°C. in decinormal HCl, unstable in normal NaOH. At 55°C. in distilled water they lost 90 per cent. of their potency in six days. With 0·5 per cent. formalin toxicity fell nearly to half in 15 days; to a half with 1 per cent. and to a third with 5 per cent. formalin. At 55°C. 0·5 per cent. formalin reduced the toxicity to one-tenth in 24 hours; with 5 per cent. formalin this took place within an hour. The effect of acetaldehyde was more rapid; at 55°C. the potency was reduced from 0·05 to 0·08 mgm. per 100 gm. rat in an hour, and in 24 hours was reduced to one-tenth. The species of scorpion examined were: *Buthus quinquestriatus*, *B. leptochelys*, *B. acutecarinatus* and *B. hottentotta minax*. For obtaining venom, which was done with the first and last of these, the poison gland was stimulated electrically and the venom collected through a capillary tube fitted to the sting. The venom was milky and clotted on standing. The absorption bands of all four toxins were the same, 278 mμ, that of the two venoms 262·5 mμ. The absorption band was found to change with change in toxicity. *H. Harold Scott.*

Fairbairn, D. **The Phospholipase of the Venom of the Cottonmouth Moccasin** (*Aghistrodon piscivorus* L). *J. Biol. Chem.* 1945, Feb., v. 157, No. 2, 633–44, 4 figs. [25 refs.]

Essex, H. E. **Certain Animal Venoms and their Physiologic Action.** *Physiol. Rev.* 1945, Jan., v. 25, No. 1, 148–70. [225 refs.]

Boquet, P. Action catalytique du cuivre au cours de l'oxydation des venins de " Vipera aspis " et de " Naja tripudians " et d'une toxine végétale la ricine par le peroxyde d'hydrogène. [**Catalytic Action of Copper during the Oxidation of certain Venoms and Vegetable Toxins.**] *Rev. d'Immunologie.* Paris. 1940–1941, v. 6, No. 6, 393–403. [39 refs.]

Ramon, G., Boquet, P., Richou, R., Nicol, L. & Mme. Delaunay-Ramon. Sur la production accélérée des sérums antivenimeux de différentes sortes au moyen des anavenins spécifiques et des substances stimulantes de l'immunité: ses conditions—ses résultats. [**Accelerated Production of Antivenenes by Means of Anavenins.**] *Rev. d'Immunologie.* Paris. 1940–1941, v. 6, No. 6, 353–62. [Numerous refs.]

DERMATOLOGY AND FUNGOUS DISEASES.

Oteiza, A. La lesión inicial experimental de la pinta, mal del pinto o carate en Cuba. [**The Initial Lesion in Pinta Inoculations.**] *Rev. Sifilografía, Leprología y Dermatología.* Marianao, Cuba. 1945, Jan., v. 2, No. 1, 5–17, 9 figs. [23 refs.] English summary.

In an examination of many articles on pinta the author has failed to find any description of the initial lesion of this disease. Some have stated that it begins with maculae (now known as *pintids*); Tellez, in 1889, recorded that he had transmitted it experimentally to 70 out of 84 persons, but he gave no account of any initial lesion.

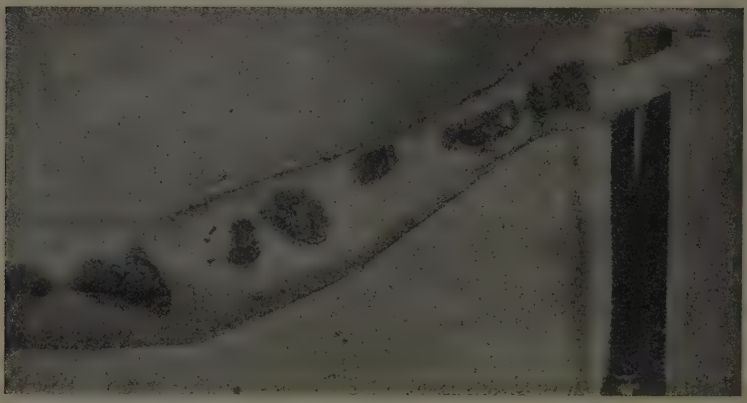
For his experiments the author used serum taken from two patients in Cuba showing early signs of pinta and injected it, diluted 1 : 10, into the front of the forearms of volunteers, as in the method for the Mantoux test. In the first experiments three men were inoculated ; in a second series nine more ; six of these had suffered from syphilis and had strongly positive Wassermann and Kahn reactions. The nine were inoculated from one of the first three who had shown signs of pinta during two years after being first inoculated himself. One of the syphilitics developed a typical pinta lesion. The incubation period, between inoculation and the first sign, varied widely between limits of 6 and 61 days. The primary lesion and its evolution are described very fully and illustrated by a series of photographs, but tell us little more than did León y Blanco in his account in 1940 [this *Bulletin*, 1941, v. 38, 90]. The first sign is a slightly infiltrated erythematous spot, reddish in colour, the size of a pin's head, which enlarges to a papule with squames, reddish in white subjects, dark violaceous in negroes and half-castes. The squamous epithelium becomes stratified and fissured, with a red halo. The whole may become lichenoid, or like psoriasis, or evolve with an atrophic centre, erythematous and squamous border and pigmented areas. There may be many satellite papules. Itching is usually present and the lesion may be aggravated by scratching. Spirochaetes are to be found, at least in the first 60 days of the infection. [The author acknowledges that León y Blanco was the first to describe the initial lesion in 1939 and gives as reference the paper by the latter abstracted in this *Bulletin*, *ibid.*, p. 89, but does not refer to the fuller account in a paper following that one in the same Journal, *Rev. Méd. Trop. y Parasit.*, Habana, abstracted in this *Bulletin*, 1941, v. 38, 90]. *H. Harold Scott.*

Blanco, F. L. & Oteiza, A. Sobre la transmision experimental de la pinta, mal del pinto o carate al conejo. [**Experimental Transmission of Pinta to the Rabbit.**] *Sanidad y Beneficencia Municipal.* Habana, Cuba. 1944, July–Sept., v. 4, No. 1, 11–15, 4 figs.

Several investigators have tried, but ineffectually, to transmit the spirochaete of mal del pinto to laboratory animals ; the positive results here recorded, therefore, are important. In December 1943, a Jamaican negress was seen by one of the authors and diagnosed as a typical case of pinta (the Kahn and Meinicke reactions were markedly positive) and in the cutaneous lesions *Spirochaeta herrejoni* was seen. A volunteer was inoculated in two places on the anterior surface of the left forearm with serum from one of the dyschromic spots and pinta lesions have developed at the site. The next month, fluid obtained by pressure from the initial lesions in this volunteer was injected intradermally into the scrotum of each of four rabbits. In June, 105 days later, one of the rabbits showed a red papule at the site of injection, and ten days later this was topped by a superficial erosion covered by a dark scab. In the blood-stained serum from this numerous spirochaetes were seen and with the fluid four more rabbits were inoculated and also a human volunteer on the left forearm. The latter presented a local inflammatory reaction which disappeared in 72 hours, but 13 days after the inoculation there was seen an erythematous spot, 2 mm. in diameter, which in a month increased to 6 by 4 mm. and was covered with fine scales ; serum pressed from this contained spirochaetes. [See this *Bulletin*, 1941, v. 38, 89, 90. It may be noted, as of some interest, in regard to the original case in the present paper with markedly positive Kahn reaction, that León y Blanco has himself recorded that, in primary pinta at least, the Wassermann and Kahn reactions are negative (this *Bulletin*, 1941, v. 38, 91), so that the woman was suffering also from syphilis.] *H. Harold Scott.*

Trespalacios, F., Gonzalez Peris, G. & de Laosa, O. Esporotricosis linfangitica. Reporte de tres nuevos casos. [**Sporotrichial Lymphangitis.**] *Rev. Sifilografía, Leprología y Dermatología.* Marianao, Cuba. 1945, Jan., v. 2, No. 1, 26–30, 3 figs.

Sporotrichosis is said to be uncommon in Cuba; the authors consequently deem it worth while to record three cases recently under their care. All three were whites, their ages 54, 14 and 24 years, and all were employed in cane-cutting and sustained slight injuries from cane splinters. In the first the primary lesion was on the upper third of the anterior surface of the left forearm; in the



Case of sporotrichial lymphangitis, showing primary lesion on the dorsal aspect of the left hand at the root of the thumb, and extension along the lymphatics to produce secondary lesions.

[Reproduced from the *Revista de Sifilografía, Leprología y Dermatología.*]

second over the tibio-tarsal articulation of the left foot; in the third on the dorsal aspect of the left hand at the root of the thumb. In each case the evolution was typical, early ulceration, purulent discharge, crusting over and breaking down, and extending along the lymphatics to produce secondary lesions similar to the primary. Administration of iodides gave good results. In the first two *Sporotrichum beurmanni* was cultivated; from the third no growth was obtained. *H. Harold Scott.*

Negroni, P. & Bonfiglioli, H. Piedra blanca de las extremidades de los pelos producida por *Trichosporon ribeiroi.* [**White Piedra of the Hair Tips caused by** *Trichosporon ribeiroi.*] *Rev. Argentina Dermatosifilología.* 1944, Dec., v. 28, No. 4, 487–94, 4 figs.

The authors describe a peculiar type of piedra of the scalp hair affecting only the hair tips. The nodules, suggesting the appearance of louse nits, were about 1·0 mm. in diameter and consisted of a colony of a hyaline fungus (Mucedinaceae) attached tightly to the hair tip, on which it formed a cap or sheath. There was some penetration into the hair substance through the cut end. Microscopically, the nodule was found to consist of a densely compacted mycelium breaking up into arthrospores from 3·32 to 4·98 μ in diameter; smooth-walled, hyaline and tending to become spherical.

In culture the fungus presented the characters of the genus Trichosporon. On wort-gelatin the single colony reached a diameter of 5 mm. and was elevated, cerebriform, dry, opaque, whitish and of a pasty consistency. On liquid media the fungus forms a surface growth. The optimal temperature for vegetation is 25°C. to 28°C.

Micromorphology.—In parasitic life, smooth-walled, hyaline arthrospores measuring 3·32 by 4·98 μ. In culture a pseudomycelium 1·66 μ in diameter with arthrospores 6·94 to 9·96 μ by 2·50 to 3·30 μ; blastospores 4·50 to 7·62 μ by 3·32 μ, and blasto-arthrospores 6·64 to 4·15 μ.

The fungus has no property of fermenting sugar; it coagulates milk but does not liquefy gelatin or coagulated serum.

It was not found pathogenic, by intravenous, subcutaneous or intraperitoneal inoculation, to the rabbit or guineapig.

A pure yeast-form culture consisting of rounded, oval or elongated cells was developed by repeated subculturing on rabbit blood-agar or N.N.N. agar, and incubating at 37°C.

A piedra-like growth on hairs was produced *in vitro* by sowing the fungus in a medium of gelatin with casein, yeast-wort and various salts, to which sterilized hairs were added. Nodules developed along the hair shafts but were most numerous at the tips. The growth embraced the circumference of the hair but did not penetrate its substance.

The fungus is described as a new species under the name *Trichosporon ribeiroi* Moraes, and the diagnosis in Latin is given. *J. T. Duncan.*

Snow, J. S., Wedding, E. S. & Tomlinson, W. J. **Chromoblastomycosis: Report of the First Case observed in the Canal Zone.** *Arch. Dermat. & Syph.* 1945, Feb., v. 51, No. 2, 90–93, 4 figs.

HEAT STROKE AND ALLIED CONDITIONS.

Weiner, J. S. **The Diuretic Response of Men working in Hot and Humid Conditions.** *J. Physiology.* 1945, Mar. 28, v. 103, No. 4, 36P–37P, 1 fig.

Ten men, aged 20–25, did physical work by stepping on to a stool one foot high 24 times a minute for 5 minutes in every 20 minutes during two hours; this was done both in ordinary room conditions and in a hot room at 100°F. dry bulb, 93°F. wet bulb (R.H. 77 per cent. eff. temp. 94°F.). Immediately before beginning the work each man had a drink of 750 cc. of water, and the loss due to sweating was replaced every 20 minutes to preserve the water balance. In the hot room the rectal temperature was about 102°F. after two hours, and the sweat loss was about 1 litre per hour after the first hour. Sixty-six experiments were made in the hot room and 25 in ordinary room conditions, and the response to 750 cc. of water in ordinary room conditions was studied on 60 occasions. The results were consistent.

In ordinary room conditions diuresis occurred in nearly every case; after taking extra water in the morning, about 700 cc. of urine was passed during the exercise period, but afterwards very little urine was excreted. In the hot room the urinary output decreased markedly during the two-hour work period; sometimes this decrease did not take place until sweating was profuse. The total amount of urine was nearly always less than half that excreted in ordinary room conditions. A diuresis usually occurred also about an hour after leaving the hot room. The cause of the reduction in the urinary output in the hot room is unknown. Reference is made to experiments by Barclay and Nutt (*J. Physiol.*, 1944; v. 103, 20P). *J. F. Corson.*

PLATT, R. **Uraemia and Heat-Stroke : an Exercise in Diagnosis.** [Memoranda.] *Brit. Med. J.* 1945, Mar. 31, 445.

The patient referred to in this note was a soldier in Italy, who complained of dysuria and frequency of micturition, with vomiting. His mental condition was dull, his temperature 101°F. There was heavy albuminuria and the blood urea was 108 mgm. per 100 cc., but there was no haematuria, oedema or hypertension, and the diagnosis of acute nephritis was rejected. It is known that heat stroke can give rise to a similar condition, and this diagnosis was supported by the fact that the patient's knee jerks were absent and that his urine was almost free of chlorides. Rest and the generous administration of fluid and salt led to rapid and complete recovery ; the albuminuria disappeared, and the blood urea value was lowered to 20 mgm. *Charles Wilcocks.*

TROPICAL ULCER.

MARSH, F. & WILSON, H. A. **Tropical Ulcer.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1945, Mar., v. 38, No. 4, 259–70. [44 refs.]

In December 1942 the authors undertook to investigate and treat cases of tropical ulcer in labourers of the Anglo-Iranian Oil Company, in Persia.

In their opinion Vincent's spirochaete and fusiform bacillus are the predominant organisms, but dirt and trauma are also essential factors, and various causes of ill-health such as malnutrition and infections are predisposing causes ; they express the aetiology shortly by the words " Filth ; Food ; Friction ; Fuso-spirillosis."

A short history of the " lock-up " plaster of Paris method, practised by Winnet Orr and Trueta for fractures and applied to the treatment of tropical ulcers by CONNELL and BUCHANAN [this *Bulletin*, 1934, v. 31, 337] and others, is given, as well as references to nearly all other recent forms of treatment.

The authors used the plaster of Paris bandage over dressings containing various mixtures—nine ointments, including " Bipp " and " Zipp," five washes, and potassium permanganate crystals. The composition of these is given in the text and details of cases treated are given in two appendices which lack of space prevented from being printed in this journal ; they have been filed, however, at Manson House and are available for reference.

Altogether, 85 ulcers were treated ; the ulcer was washed and the selected ointment applied on a single layer of gauze, covered with a much larger single layer of vaselined gauze, and encased in a plaster of Paris bandage. Patients were seen once a week or once a fortnight. About 70 per cent. of ulcers healed within seven weeks, the average time being rather more than two weeks.

The authors concluded that the " lock-up " method is very good, that " Bipp " and " Zipp " are valuable applications, and that the sprinkling of a fine layer of small potassium permanganate crystals on the ulcer promotes rapid healing in some otherwise resistant cases. *J. F. Corson.*

NYASALAND PROTECTORATE : ANN. REP. MED. DEPT. YEAR ENDING 31ST. DEC., 1943 [Abridged]. 12–16. **Tropical Ulcer. Dr. W. T. C. Berry's Preliminary Review of his Investigations.**

This is a preliminary report of a three years' investigation of tropical ulcers in natives of Nyasaland. Two villages with very different living conditions were selected and frequent observations were made on leg abrasions occurring in the village children. A detailed report will be given later. During the second

and third years, selected groups of children were given dietary supplements—either meat or yeast. In addition to these observations some experiments on volunteers were made.

The author concluded that fusiform bacilli played a more important part than spirochaetes ; no ulcers developed from abrasions infected with cocci only, but when fusiform bacilli appeared the abrasion became more severe in character. It was observed, however, that only nine ulcers developed among 120 abrasions in which fusiform bacilli were present.

The incidence was much higher in the rainy season than in the dry season ; in the former there were 10 ulcers in 672 abrasions, in the latter five ulcers in 764 abrasions. In the rainy season, fusiform bacilli were present in 87 (22·8 per cent.) of 381 abrasions ; in the dry season they were found in only 33 (7·9 per cent.) of 414 abrasions. The difference was attributed to the damp and cold air and also the greater number of flies (chiefly *Musca sorbens*) present during the rainy season.

It was found that ulcers developed among the children who received the meat or yeast supplements.

Experiments on volunteers.—Three African labourers were inoculated with ulcer pus on scarified areas over the external malleoli ; all developed ulcers.

A labourer was inoculated with pus over the external malleolus and also over the external condyle of the humerus on both arms ; the latter healed by first intention but a typical tropical ulcer developed at the leg site.

Another labourer was inoculated with pus over both external malleoli ; when ulcers appeared he was kept in bed, one leg being raised on a Thomas's splint and the other lowered through a hole in the bed to the ground. After three days the ulcer on the lowered leg was very painful and the leg had to be raised on to the bed ; the other ulcer was painless and was smaller.

The author inoculated himself and a control with pus from an ulcer [site not stated] ; the control developed a severe ulcer while the author had only a small sluggishly progressing sore.

In conclusion suggestions are made for further experimental work which is regarded as the most promising method of investigation of tropical ulcers.

J. F. Corson.

MISCELLANEOUS DISEASES.

MENON, I. G. K. **Tropical Eosinophilia.** *Indian Med. Gaz.* 1945, Jan., v. 80, No. 1, 24–30. [19 refs.]

The author records and analyses eight cases of this curious condition and proceeds to discuss its aetiology. The whole, though it does not solve the problem, sets forth very clearly the different theories as to its causation and the *pros* and *cons* of each. Even at the risk of repeating what has been said before in this *Bulletin* [1941, v. 38, 538, 539 ; 1943, v. 40, 720, 721, 948 ; 1944, v. 41, 424–426, 969] it will be useful to give a résumé of its symptomatology. Males are more often attacked than are females and a common age is 20–30, though cases occur both above and below these limits. There may be a persistent low irregular fever (99–102°F.) at the start of illness, with dry irritant cough, small scattered foci in the lungs or marked hilar shadows, both of which may be transient ; enlargement of liver or spleen may occur but is neither common nor marked ; there often is loss of weight. Blood changes comprise an increase in red cells as a rule (to 5·3 or even 6·7 millions per cmm.), leucocytes two or three times the normal totals, of which eosinophiles constitute one- to two-thirds

and are of the mature type. It is not uncommon for the Wassermann and the Kahn (less often) to give false positive reactions. Arsenicals bring about improvement (though the early injections may seem to aggravate the symptoms and some patients get over the acute period of the disease without any treatment).

The question of aetiology is ably discussed under the following heads :—

1. *Allergy.*—The eosinophilia is in favour, but in allergic conditions generally this may not be high and there may be little, if any, leucocytosis.

2. *Eosinophil leukaemia.*—But such a condition is not well established as is myeloid or lymphocytic leukaemia ; the prognosis is good whereas in other leukaemias it is bad. In the author's words : " The very existence of eosinophil leukaemia is still under doubt. To postulate the existence of a benign eosinophil leukaemia is, therefore, only to add to the confusion."

3. *Leukaemoid group.*—Lymphadenoma and metastatic malignant deposits are ruled out by the favourable prognosis in " tropical eosinophilia."

4. *Infection.*—(i) *Helminthic.*—No ova seen as a rule ; anthelminthic treatment quite ineffectual in this syndrome even if, ova being present, this element is removed.

(ii) *Protozoal,* mentioned but not considered.

(iii) *Bacterial* or *Viral.*—The low fever, the splenomegaly and the hepatomegaly (sometimes present) and the transient adenopathy with a progress towards spontaneous recovery are characteristic of other fevers, such as enteric, undulant, relapsing fever and infective mononucleosis.

The author concludes that the evidence is in favour of some infection, the nature of which is not yet known. *H. Harold Scott.*

LAL, H. B. **Tropical Eosinophilia. A Report on Fifteen Cases.** *Indian Med. Gaz.* 1945, Jan., v. 80, No. 1, 30–32.

[This may be regarded as the counterpart of the last (see MENON above) and it would be of much interest if Colonel Lal and Dr. Menon could meet and we could overhear the discussion between them on this subject. The two papers serve to show how opposite opinions can be argued on the same data.] Colonel Lal gives a summary of fifteen cases under his observation. He strongly opposes what he regards as the present " complacent attitude " of the medical profession in looking upon it as a " separate clinical entity which has a specific treatment, namely arsenicals." He sketches the symptoms, stating that 12 of the 15 were afebrile [but as MENON states above, the fever occurs in the early stages and the present author may have seen his patients after the fever had subsided]. The disease recurs at intervals throughout a long period " one month to ten years." Colonel Lal regards the condition as a sensitization from which the patient has never completely recovered ; he may come to the hospital with bronchitis and, after an interval, return with " tropical eosinophilia " ; variations in symptoms, physical signs and X-ray findings, as in asthma, the presence of eosinophil cells in the sputum, lack of permanency of cure, these are the main facts which lead him to regard " eosinophil lung " as a misnomer and he prefers the name " allergic pneumonia ".

H. Harold Scott.

KLOPSTOCK, A. & STEINITZ, H. **An Epidemic Occurrence of Eosinophilic Erythredema in Palestine.** *Harefuah.* Jerusalem. 1945, Mar. 15, v. 28, No. 6. [In Hebrew 117–19. English summary 119–20.]

(*a*) *Clinical Aspects.*

" A syndrome, previously unknown in Palestine, has made its appearance in Tel Aviv, in sporadic cases within the last few years and in large numbers since November 1944.

" The characteristic manifestations of this disease are : the appearance of red swelling and infiltrations on the skin and mucous membranes which are transient and migrant over wide areas of the body, associated with eosinophilia and frequently with leukocytosis.

" The etiology is still unknown and till its discovery we tentatively suggest Eosinophilic Erythredema as the name.

(*b*) *Epidemiological Aspects.*

" The new syndrome of ' Eosinophilic Erythredema ' is characterised by skin swellings and eosinophilia, the latter observable in the blood, sternal punctate and in the tissues. That and the clinical aspect of the disease make it certain that we have to deal with an allergic phenomenon.

" More than a hundred cases are known with certainty, but the real number is probably much greater. So far cases were seen in Tel-Aviv and its surroundings, Rehovoth, Chederah, Haifa and Jerusalem. The first cases diagnosed were seen in November 1944. Retrospective diagnosis in some cases seems probable as far back as 1942, possibly 1941. It is too early to say anything about the distribution of the disease in the different communities. Neither sex is preferred. Only two cases among children are known so far. As a rule only one member of a family fell ill.

" The etiology remains obscure. An extraneous allergen seems improbable. The possibility that the disease could be the allergic phase of Filariasis (' Calabar-swellings ') is discussed. But no Microfilaria have been found, the rare biopsies have yielded no parasites and serological tests could not be performed. Only continued research can bring a solution."

LEFFKOWITZ, M. & SUKIENNIK, S. **The Clinical Picture of an Eosinophilic Disease with Cutaneous Manifestations.** *Harefuah.* Jerusalem. 1945, Mar. 15, v. 28, No. 6. [In Hebrew 120–22. English summary 122.]

" The clinical picture of the new disease which made its appearance in Tel Aviv, its surroundings and in Jerusalem, during the end of 1944 and the beginning of 1945 is described on the basis of 23 cases.

" 50% of the cases presented prodromal complaints for from 2 to 8 days prior to their illness.

" The disease usually starts with severe itching or occasionally only with pain. This is associated with swelling, with or without local heat and redness, occasionally in the form of lymphangitis with surrounding redness and infiltration. The swelling usually subsides after 2–3 days, but occasionally persists for a week or two. The swelling may appear anywhere and is migratory in character. After it subsides subcutaneous nodules are sometimes found which also disappear after some time. Two cases had enlarged lymph glands and two started with a low grade fever.

" While the cutaneous lesions are apparent the patients usually have a feeling of malaise while some continue their occupations as usual.

" 90% of the cases had an eosinophilia ranging from 8 to 48%. 40% had leukocytosis 11–14,000. The blood sedimentation rate was normal or slightly increased, urine, stools, fluoroscopy of the chest, Kahn, and the red blood count were normal ; no parasites were found in thick drops taken both in the day time and at night. Puncture of the swellings showed many eosinophiles and several giant cells.

" Etiology is still obscure."

BERK, J. E. **Transitory Pulmonary Infiltrations.** [Correspondence.] *J. Amer. Med. Ass.* 1945, Feb. 10, v. 127, No. 6, 354–5.

In a leading article in the *Journal of the American Medical Association*, November 25, 1944, Loeffler's syndrome is discussed and among possible causes, infestation with *Ascaris lumbricoides*, *Fasciola hepatica*, or *Entamoeba histolytica* is mentioned. In the present letter, the author gives several references [see this *Bulletin*, 1930, v. 27, 468; 1933, v. 30, 224; 1936, v. 33, 119; 1937, v. 34, 30; 1939, v. 36, 844] to reports of the association of transient pulmonary infiltrations with infestation with *Necator americanus* and with *Strongyloides stercoralis*, particularly the latter. From these it would appear that the infiltrations may be due to the presence of the larvae in the lungs, therefore a careful examination of the sputum and stools for ova and parasites should be made in cases with Loeffler's syndrome. *J. F. Corson.*

HARTZ, P. H. **Role of Schistosomiasis in the Etiology of Cancer of the Liver in the Chinese.** *Arch. Pathology.* 1945, Jan., v. 39, No. 1, 1–2.

In Curaçao, in the Netherlands West Indies, there were five cases of liver cell cancer in 33 autopsies made on Chinese men during eight years, and in none was there any sign of schistosomiasis. During the same period, in 1,350 autopsies made on Negroes and white people, there were only three cases of liver cell cancer and one case of bile duct cancer.

It has been suggested that in China and the neighbouring eastern regions the greater incidence of primary cancer of the liver among the Chinese, as compared with other races of those regions, is associated with cirrhosis caused by schistosomiasis; the observations recorded in this paper give no support to that suggestion. *J. F. Corson.*

TOMLINSON, W. J. & WILSON, L. A., Jr. **Esophageal Carcinoma in British West Indian and Panamanian Negroes: a Study of the Incidence, Etiologic Factors and Pathologic Anatomy in Fifty Cases.** *Arch. Pathology.* 1945, Feb., v. 39, No. 2, 79–80.

VONFRAENKEL, P. H. & KRICK, E. S. **Fish Poisoning by Barracuda in the Marianas.** *U.S. Nav. Med. Bull.* 1945, Feb., v. 44, No. 2, 427–31.

Sphyraena barracuda, or the Barracouta, is a pike-like fish whose flesh is often eaten with relish and without ill effects. At other times it gives rise to serious, though rarely fatal, symptoms of food-poisoning. In this article the authors give an interesting account of an outbreak on a vessel with a complement of 55 operating in the Marianas area. A large barracouta, some 50 lb. in weight, was caught; it was cleaned 2½ hours later and hung over the side of the ship in sea-water, being served, fried, seven hours after cleaning. Thirty out of 31 members of the crew who ate of it were taken ill (the other had had very little of it), and 24 who had had none remained well.

The chief symptoms were a burning and tingling sensation in the mouth, and a few minutes later in the stomach also; five men suffered with nausea and vomiting. After 4–5 hours nervous symptoms began to appear: flushing and paraesthesia of the face, neck, mouth and limbs in all, mydriasis, ptosis and strabismus in some, and neuralgic pains in eyes and temples, and in the joints and back. Twenty-four men presented a peculiar symptom—recurrence of paraesthesia after a cold shower—and all thirty complained of thirst or craving for cold water, but, on attempting to drink, stated that they could not swallow it as it "burnt and stuck" in the throat. Most of those affected exhibited low blood pressure, 90–60 systolic and 50–40 diastolic, with bradycardia down to 50 beats a minute. Deep reflexes were lost in about half the patients.

Treatment applied was purely symptomatic: gastric lavage, emetics and purgatives, hot tea or coffee, stimulants for collapse, etc. Improvement set in after 72 hours and recovery was uninterrupted, the men being able to return to duty within a week.

[Several points of interest regarding barracouta poisoning remain to be cleared up and the position today is much the same as when the reviewer wrote more than a quarter of a century ago: "According to some this [fish] is toxic owing to its having fed on poisonous material; others maintain that it is poisonous at certain seasons, especially at spawning time. The fact that the poisonous ones are usually over 20 lb. in weight, while small specimens appear to be harmless, and the idea that the fish are poisonous at certain seasons only, lend support to this." (The fish eaten on the occasion mentioned by the authors was a large one of 50 lb.) "There is yet a third view that the large barracouta may contract an infectious disease, the symptoms of which are evident in the flesh, and that this disease is the cause of the poisoning. The fish is much relished by the poorer natives and it is somewhat astonishing that more cases of poisoning are not met with.

"The natives regard barracouta caught in certain localities as dangerous. In some cases a plausible and possibly correct explanation is given for this; thus, fish caught to the north of Necker Island, near Virgin Gorda, are said to contract the poison from feeding on the banks in close proximity to the copper mines or on other fish which have done so. In other cases no satisfactory reason is forthcoming, as for example in Turk's Island the fish caught in one part are eaten with impunity, while others caught barely a mile away are regarded as poisonous." (The authors of the article reviewed above state that it is generally held that in the Marianas and Marshall Islands the barracouta is poisonous, but that the same species in the Caroline Islands is not). "Cases of poisoning appear every year in Cuba, Jamaica, Barbadoes, Turk's Island and among the Virgin Islands. The natives regard as poisonous such fish as show either: (i) an exudation of a whitish watery fluid when the flesh is cut up, or (ii) a black or purple coloration at the base of the teeth. In Cuba a fine specimen was exhibited in the market, but owing to this coloration being present would-be purchasers were warned of the possible danger in eating it. Disregarding the warning, many ate of it and the following day there were numerous cases of poisoning."] *H. Harold Scott.*

LEE, R. K. C. & PANG, H. Q. **An Outbreak of Fish Poisoning in Honolulu, Hawaii.** *Hawaii Med. J.* 1945, Jan.–Feb., v. 4, No. 3, 129–32. [11 refs.]

The authors give details of eight cases (out of 24) of poisoning after eating black sea bass which, to all appearances, was fresh and wholesome. This fish belongs to the Grouper family, of which over 400 species are known. It goes by the names *hapapuu* in Hawaii, *shakpan* in China and *ara* in Japan. "The navy handbook mentions only three poisonous fishes [in Honolulu] but Sgt. Shermer [who is cataloguing poisonous fish on behalf of the Government] states that there are literally hundreds of fishes containing a poisonous alkaloid."

The eight cases reported presented very similar symptoms; one recitation will suffice. The patient ate some of the fish at 7.30 p.m.; five hours later he had slight abdominal pain and diarrhoea with liquid stools at 10–15 minute intervals for two hours, without nausea or vomiting. At 2 a.m. ($6\frac{1}{2}$ hours after the meal) his lips began to feel numb, then his face and hands, with aching pains in thighs and knees, the pain becoming very severe during the next six hours. There was also a burning sensation in lips and mouth on drinking water and warm objects gave a feeling of coldness. The same sensations were present in the soles, so that walking barefoot was difficult; knee-jerks were normal.

Two days later, the patient complained of itching in palms and soles, but there was no rash. When discharged from hospital a week later he still had some alteration of sensation in hands and feet, but no pain.

The remainder of the paper is concerned with general remarks on fish-poisoning and quotations from the literature with which readers of this *Bulletin* are familiar. *H. Harold Scott.*

GENERAL PROTOZOOLOGY.

Beltrán, E. Resultados comparados de diversos metodos para el diagnostico de protozoarios intestinales. [**Comparison of Diagnostic Methods for Intestinal Protozoa.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1944, Sept., v. 5, No. 3, 175–84, 2 graphs. [16 refs.] English summary.

The examination of the faeces of 200 children in Mexico for intestinal protozoa by direct examination (saline or iodine), haematoxylin stained films, and zinc sulphate concentrations, has shown that the first is the most reliable. The examination of three samples by the three methods gave a parasitism rate of 98 per cent. with a 63·5 per cent. rate for *E. histolytica*. The concentration method came second in efficiency. Combination of two methods or all three increases the number of positive results. *C. M. Wenyon.*

Beltrán, E. & Raúl Larenas M. Infección humana por *Isospora hominis* en Mexico. [*Isospora hominis* **Infection in a Man in Mexico.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1944, Sept., v. 5, No. 3, 185–9, 2 pls. English summary (4 lines).

The case reported is that of a man 25 years of age suffering from dysenteric symptoms in Mexico City. Faecal examination revealed an *Isospora hominis* infection. This is the first record of this parasite in Mexico. *C. M. Wenyon.*

Freed, L. F. **Two Cases of** *Trichomonas vaginalis* **Infestation of the Male.** *South African Med. J.* 1945, Mar. 10, v. 19, No. 5, 73.

GENERAL ENTOMOLOGY.

Callot, J. & Dao Van Ty. Contribution à l'etude des moustiques français. Culicides de Richelieu (Indre-et-Loire). [**The Mosquitoes of France : Culicidae in Richelieu (Indre-et-Loire).**] *Ann. Parasit. Humaine et Comparée.* 1944–1945, v. 20, No. 1–2, 43–66, 13 figs. on 2 pls. [29 refs.]

Culpepper, G. H. **The Rearing and Maintenance of a Laboratory Colony of the Body Louse.** *Amer. J. Trop. Med.*, 1944, Sept., v. 24, No. 5, 327–9, 3 figs.

The lice are kept on 1½-inch squares of dark-coloured woollen cloth with approximately 100 adult, or proportionately more nymphal, lice per piece. The patches with the lice are kept in crystallizing dishes which hold 40 to 60 of them, *i.e.* 4,000 to 10,000 lice. The lice cannot climb the polished sides of the dishes and escape. The dishes are kept in an incubator at 30° to 32°C. and at about 75 per cent. R.H. Twice a day, at 8 a.m. and 5 p.m., the lice are fed on " research subjects." [It is understood that these are usually negroes, employed for the purpose.] The method is as follows : the man having removed his clothes, lies face downwards on a table. The cloth squares with the lice are laid carefully all over his back, overlapping like tiles on a roof. The lice leave

the upper side (sometimes they are stimulated to do so by bright light) and begin to feed under the cloth. When they have fed they return to the fabric, the whole process taking about 35 to 45 minutes. At the end of the feeding the patches are removed and stray lice are picked off with forceps and, finally, by rubbing with a towel.

As many as 40,000 lice may be fed, at one time without great discomfort except to sensitive subjects, who have to be excluded. The men are very rarely called upon to feed lice more often than once a week. Most of the 40 men employed in this work have fed lice for 6 to 18 months without any apparent deleterious effect on their health.

The method ensures a large and healthy colony of lice. The authors state that they have been using daily about 1,200 lice and 875 eggs in experiments over a period of 18 months. *J. R. Busvine.*

OVCHINNIKOVA, L. M. [**Complex Dusts in Pediculosis Control.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1944, v. 13, No. 2, 79–83. [In Russian.]

OVCHINNIKOVA, L. M. [**The Use of Albichtol for the Lice Control.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1944, v. 13, No. 2, 83–7. [In Russian.]

DAVIS, L. J. **Pulmonary Acariasis in Monkeys.** *Brit. Med. J.* 1945, Apr. 7, 482, 1 fig.

In view of the possible aetiological connexion between acariasis of the lungs in monkeys and cases of bronchitis, asthma and " eosinophil lung " of obscure causation in man, the author records finding mites in the lungs of a Macaque in Hong Kong in 1933. He observed nodules near bronchioles and these nodules were capsular with walls of cellular granulation tissue ; in the lumen were found the remains of a mite surrounded by cellular detritus. Radiologically, small discrete foci were seen scattered in the lungs. There is little doubt that the monkey became infested through inhalation and further investigation may reveal that man suffers similarly from inhalation of dust. [To the unaided eye these foci in monkeys often strongly resemble tuberculous lesions, but tubercle bacilli are not seen unless this disease complicates the acariasis. The abstracter, when holding the appointment of pathologist to the Zoological Society of London, used to send portions of tuberculous organs to the late Stanley Griffith for typing of the bacillus. With a large number of autopsies it was not always possible to examine for tubercle bacilli before sending off the tissues and the reply might be that the tissue was not tuberculous at all, but was infested by Acarus, or that there was a mixture of tuberculosis and pulmonary acariasis. These lesions were most frequently found in the bodies of Rhesus monkeys. See this *Bulletin*, 1945, v. 42, 73.] *H. Harold Scott.*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS.

CATHIE, I. A. B. **Tropical Medicine in the Middle East 1940-1942.** *Acta Tropica.* Basel. 1944, v. 1, 303–19, 1 map.

HARRIS, P. N. **Protection against Lethal Doses of Pentavalent Arsenical and Antimonial Compounds in Rats by *p*-Aminobenzoic Acid, a Histological Study.** *J. Pharm. & Exper. Therap.* 1944, Nov., v. 82, No. 3, 254–60, 3 figs.

Little work has been done on the histology of poisoning by arsenicals since BROWN and PEARCE [this *Bulletin*, 1920, v. 15, 390] showed that the chief

lesion caused in laboratory animals by tryparsamide occurred in the kidney. Recently SANDGROUND and HAMILTON [this *Bulletin*, 1944, v. 41, 372] have shown that PAB (*p*-aminobenzoic acid) protects rats against lethal doses of tryparsamide and stibosan, and does not interfere with trypanocidal action. The present author has studied by histological methods the protective effect of this substance to rats receiving toxic doses of the above drugs. The latter were given to animals weighing 90–100 gm., in a single dose of 3,200 mgm. per kgm., intravenously in the case of tryparsamide, and in a dose of 250–375 mgm. per kgm., or in some cases two doses of 250 mgm. per kgm. on successive days, in the case of stibosan. Some rats were also given PAB in doses of 750–1,000 mgm. per kgm. on 1–5 occasions on successive days, the first dose being administered shortly before the arsenical or antimonial (designated as PABA rats, the others being the controls). Twenty-four hours after drug administration, the two sets were markedly different in appearance, and the difference became more pronounced. The controls were lethargic, their eyes were covered with exudate, and many died. There was some indisposition and a few deaths in the PABA set. When control animals died, a corresponding number of the other set were killed for comparative studies. In rats receiving tryparsamide alone, renal lesions were most constantly present, only 1 of 11 animals being normal. They consisted of areas of necrosis of varying degree in convoluted tubules with later regeneration occurring in some cases. Other pathological changes were present in heart, liver, lungs, thymus and intestines. The kidneys in 8 of 10 of the PABA rats were normal. The renal lesion was also most prominent after administration of stibosan, and none of 32 rats which received this substance alone had normal kidneys, while 7 of 17 in the PABA set were normal.

J. D. Fulton.

[In this paper the letters PABA are used in reference to rats given *p*-aminobenzoic acid and treated with an arsenical or antimonial, but the same letters have been used by other authors to refer to *p*-aminobenzoic acid alone. In Spanish the letters APAB (acid *p*-aminobenzoic) have been used to indicate the acid.—*Ed.*]

YUDKIN, J. **A Simple Test for the Detection of Bile Pigments in Urine.** [Memoranda.] *Brit. Med. J.* 1945, Mar. 31, 445.

The author (*Nature*, 1945, Jan. 13, 50; *J. Trop. Med. & Hyg.*, 1945, v. 48, 1) has shown that coloured substances, such as mepacrine [atebrin] can conveniently be estimated by "adsorption colorimetry," the substance being adsorbed on to a measured amount of white absorbent powder. In the present paper he describes a simple method for the detection of bile pigments in urine.

To about 10 cc. of urine in a test tube add about 0·25 cc. of silica gel powder (sifted to pass 60 mesh but not 120 or 130 mesh) and swirl the tube round once or twice every 1 or 2 minutes so as to shake the powder in the urine; after 10 minutes allow the powder to settle and pour off the supernatant urine. Add a few cc. of water to the powder, again allow it to settle, and pour off the water. A brown coloration of the powder indicates the presence of bile pigments.

The test is eight times as sensitive as Gmelin's nitric acid test and is only slightly less sensitive than the Fouchet test. Silica gel powder, already sifted, may be obtained from Silica Gel Ltd., Aldwych House, London, W.C.2.

J. F. Corson.

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